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# Enhancing Patient Safety in Critical Care Settings

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# **Enhancing Patient Safety in Critical Care Settings**



# Enhancing Patient Safety in Critical Care Settings

Guest Editor

**Meropi Mpouzika**



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# About the Editor

## **Meropi Mpouzika**

Meropi Mpouzika is an Associate Professor of Critical Care Nursing in the Department of Nursing, School of Health Sciences, at Cyprus University of Technology. Her research and teaching focus on patient safety, critical and emergency care, pain and sedation, the early recognition of clinical deterioration and sepsis, and outcomes after critical illness. She coordinates the MSc programme in Advanced Emergency and Intensive Care Nursing and supervises postgraduate research in acute and critical care. She has served as Principal Investigator on funded research projects examining chronic pain and recovery after critical illness and changes in stress responses among nursing students. Her academic achievements include more than 50 publications in international peer-reviewed journals, participation in international research collaborations, and service on editorial and international advisory boards in critical care nursing.



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*Editorial*

# Enhancing Patient Safety in Critical Care Settings: Lessons from a Multidimensional Special Issue

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Patient safety has been conceptualized as a system-level outcome that depends on coordinated efforts among healthcare professionals, effective organizational processes, and strategies aimed at preventing medical errors, avoiding preventable adverse events, and protecting patients from harm [1]. This understanding of patient safety is particularly relevant to critical care settings. Intensive care units and emergency departments manage highly vulnerable patients exposed to the risks associated with severe illness, complex therapeutic interventions, and rapidly changing clinical conditions. Consequently, these settings are associated with an increased risk of preventable harm [2–6] due to patient complexity, the urgent nature of clinical decision-making, high workload, frequent invasive procedures, and the intensity of care delivery [7]. Within this context, ensuring safe care in critical care settings remains an ongoing challenge. The eleven articles accepted for publication in this Special Issue of *Healthcare*, *Enhancing Patient Safety in Critical Care Settings*, illustrate the multifaceted nature of patient safety in critical care and form the basis for the thematic discussion presented below. Table 1 summarizes the eleven contributions according to their theme, primary focus, study design, and clinical setting, whereas the List of Contributions contains the complete bibliographic details.

Building on these contributions, five interrelated themes provide the framework for the discussion presented below. Evidence-based practice represents a cornerstone of patient safety in critical care. Translating evidence into routine clinical practice remains a recurring challenge across several contributions included in this Special Issue. In critical care settings, the benefits of evidence-based interventions depend not only on the availability of evidence but also on the ability of healthcare professionals and organizations to implement it effectively. However, generating evidence alone does not guarantee safer care. Together, these studies demonstrate that translating evidence into routine practice requires not only robust evidence but also education, professional competencies, and organizational support [8–10].

This evidence-to-practice gap is reflected in the study by Papadimitriou et al. [Contribution 1], where physiotherapists acknowledge the benefits of early mobilization but report several patient-, provider-, and institutional barriers that limit its implementation. Similarly, the study on delirium management [Contribution 2] reveals that although ICU nurses demonstrate moderate-to-high levels of knowledge, routine screening and protocolized management remain suboptimal, highlighting the need for structured education and implementation strategies. Likewise, the pilot study on nurse-performed FAST examinations [Contribution 3] demonstrates how advanced nursing competencies may support rapid bedside assessment and clinical decision-making in emergency care settings. Overall, translating evidence into routine clinical practice requires not only robust evidence but also education, professional competencies, structured clinical protocols, and organizational support.

**Table 1.** Overview of the eleven contributions included in the Special Issue.

| No. of Contribution | Theme                                       | Focus                                                                            | Study Design                           | Clinical Setting             |
|---------------------|---------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|------------------------------|
| 1                   | Evidence-based practice                     | Early mobilization implementation                                                | Cross-sectional survey                 | ICU                          |
| 2                   | Evidence-based practice                     | Delirium management practices                                                    | Cross-sectional study                  | ICU                          |
| 3                   | Evidence-based practice                     | Nurse-performed FAST examination                                                 | Pilot study                            | ED                           |
| 4                   | Early recognition of clinical deterioration | Implementation of Early Warning Scores                                           | Implementation study                   | Acute care hospitals         |
| 5                   | Workforce well-being and resilience         | Psychosocial predictors of job performance                                       | Cross-sectional study                  | ICU and ED                   |
| 6                   | Workforce well-being and resilience         | Long-term impact of resilience-building interventions                            | Narrative review                       | Multiple healthcare settings |
| 7                   | Workforce well-being and resilience         | Workplace violence, resilience and turnover intention                            | Cross-sectional study                  | ED                           |
| 8                   | Workforce well-being and resilience         | Workplace violence and the empathy gap                                           | Qualitative study                      | ED                           |
| 9                   | Patient experience                          | Psychological distress, disempowerment and the “Disempowered Warrior” experience | Meta-ethnography                       | ICU                          |
| 10                  | Patient experience                          | Psychosocial support interventions for psychological well-being                  | Scoping review                         | ICU                          |
| 11                  | Treatment safety                            | Remdesivir-associated hepatotoxicity and acute kidney injury                     | Multicenter retrospective cohort study | Acute care hospitals         |

Abbreviations: ED, Emergency Department; FAST, Focused Assessment with Sonography for Trauma; ICU, Intensive Care Unit.

Another key dimension of patient safety highlighted in this Special Issue is the timely recognition of clinical deterioration. The study on Early Warning Scores [Contribution 4] identifies workforce and organizational barriers that limit the effective use of these systems despite the potential to facilitate early intervention. These findings reinforce that early recognition systems are effective only when accompanied by adequate organizational support, training, and integration into standard clinical workflows.

A resilient and well-supported workforce represents another fundamental component of patient safety in critical care. Beyond the implementation of evidence-based clinical practices, workforce well-being, resilience, and the prevention of workplace violence remain important priorities for healthcare organizations, given their close association with the delivery of safe patient care [11–14].

The study by Bellali et al. [Contribution 5] demonstrates that self-care and self-compassion are associated with better job performance among critical care nurses, underscoring the importance of healthcare professionals’ psychological well-being. The role of resilience is further emphasized by the narrative review of resilience-building interventions [Contribution 6], which illustrates the potential benefits of such programs for nurses and the need for sustained organizational support. Workplace violence emerges as another major challenge affecting both staff well-being and patient safety. The quantitative study on emergency department nurses highlights the interplay between resilience, communication skills training, and supportive organizational environments in mitigating the adverse professional consequences of workplace violence [Contribution 7]. Complementing these findings, the qualitative study identifies a pronounced “empathy gap” between nurses,

patients, relatives, and healthcare organizations, emphasizing the importance of addressing divergent expectations and strengthening organizational responses to workplace violence [Contribution 8].

Patient safety extends beyond the prevention of physical harm to encompass patients' psychological well-being and experience of care. While efforts to improve safety have traditionally focused on preventing physical harm, increasing attention has been directed toward understanding how critically ill patients experience care and how psychological distress during intensive care unit (ICU) hospitalization may affect recovery and long-term well-being [15].

This perspective is reflected in the meta-ethnographic synthesis of ICU patients' psychological responses, which identifies a pervasive sense of disempowerment and loss of control during critical illness. The concept of the "disempowered warrior" underscores the role of empathy, communication, and patient involvement in promoting recovery and well-being [Contribution 9]. Consistent with these findings, the scoping review of psychosocial support interventions demonstrates the potential of psychosocial and psychological interventions to reduce distress and support recovery among critically ill patients. Nevertheless, the review identifies important evidence gaps and emphasizes the limited integration of psychosocial support within current critical care guidelines [Contribution 10].

The safe use of increasingly complex therapies remains another essential aspect of patient safety in critical care. Given the complexity of contemporary therapies in critically ill patients [2,16], continuous assessment of treatment safety is essential. The contribution examining remdesivir-associated hepatotoxicity and acute kidney injury illustrates the continuing need for pharmacovigilance and careful monitoring of potential adverse effects, reminding clinicians that therapeutic effectiveness must always be balanced against the potential for harm [Contribution 11].

The studies included in this Special Issue also point to several priorities for future research. Future research should focus on implementation strategies that facilitate the translation of evidence into practice, the development and evaluation of workforce-support interventions, the integration of psychosocial care into routine critical care, and the incorporation of patient-centered outcomes alongside traditional safety indicators when evaluating patient safety interventions.

Taken together, the studies in this Special Issue reinforce a fundamental lesson: ensuring the safety of critically ill patients requires more than isolated interventions; it depends on the alignment of evidence, people, and systems. As critical care continues to evolve, further advances in patient safety will depend not only on scientific and technological progress, but also sustained commitment to the human and organizational dimensions of care.

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#### List of Contributions:

1. Papadimitriou, E.; Petras, S.; Mitsiou, G.; Vasileiadis, I.; Grammatopoulou, E.; Patsaki, I. Early Mobilization of Critically Ill Patients: A Survey of Knowledge, Practices and Perceptions of Greek Physiotherapists. *Healthcare* **2025**, *13*, 1248.
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*Review*

# The Long-Term Impact of Resilience-Building Interventions on Nurses: A Narrative Review of the Quantitative Evidence and Its Implications for Critical Care Nurses

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**Abstract:** Background: To minimize systematic bias, long-term follow-up is essential to assess the effect of resilience-building interventions. However, research focuses on the short-term period immediately following these interventions. Objectives: We investigated the long-term impact of resilience-building interventions on nurses, as measured via RCTs. Methods: A narrative review based on a systematic literature search (September–15 November 2024) using the keywords “Resilience/Psychological, Adaptation/Psychological, nurses, randomized controlled trial, follow-up” in the EBSCOhost, MEDLINE, ProQuest, Google Scholar, PubMed, and Scopus databases was applied. Results: A total of 38 studies were identified. Of these, only six encompassed long-term follow-up assessment after resilience-building interventions, also meeting the inclusion criteria for this review. Two of them focused on critical care nurses. Intervention durations ranged from 8 to 12 weeks, with shorter interventions also included (90 min lecture on stress, 3 h sensory awareness class). These data suggest that resilience improvements may become apparent 3 months post intervention, even when no immediate improvement is observed upon program completion, highlighting the importance of timing in the assessment process. Conclusions: These findings provide valuable insights for researchers designing resilience programs in critical care environments. Selecting appropriate assessment tools and conducting measurements at multiple time points may be as crucial as the interventions themselves in determining their effectiveness. This is clinically meaningful since it may inform providers of resilience programs for the time frame during which they need to be applied. Potentially, future research can explore what characteristics these interventions need to have in order to be effective longitudinally.

**Keywords:** interventions; longitudinal; nurses; resilience; long-term follow-up; well-being; critical care

## 1. Introduction

Improving personal resilience among nurses in hospital settings is essential for the well-being and efficiency of employees and the safety of patients [1]. Nurses often face significant work-related stressors, which may negatively impact their physical and mental health, as well as the quality of care they provide [2]. These challenges are especially pronounced in critical care settings, where nurses encounter traumatic events and morally complex decisions, with implications for their overall well-being [3,4]. Consequently, burnout syndrome and post-traumatic stress disorder, anxiety, and depressive symptoms

are commonly reported among them [4–6]. These issues highlight the urgent need for targeted interventions to promote personal resilience, particularly for critical care nurses [7].

Several resilient-building initiatives have been developed to support nurses in coping with the emotional and physical demands of caring for critically ill patients [1,8]. However, most of these focus primarily on individual traits, often overlooking external contextual influences, such as the workplace environment, organizational support, and institutional policies, which constitute a crucial role in promoting personal resilience [1]. At the same time, the critical aspect of the duration of the intervention is frequently ignored [1].

These are even more important when one considers recent conceptual frameworks, which suggest that personal resilience is better understood as an adaptive outcome in response to prolonged or intense stress, rather than a static personality trait [7]. This dynamic perspective shows the interplay between personal characteristics and external factors in shaping an individual's capacity to recover from stress, marking a paradigm shift in the conceptualization of resilience [9].

Importantly, adaptation processes require time, making it vital to consider the temporal dimensions of resilience-building programs. Evaluating interventions should also account for factors that facilitate or hinder adaptation. Tailoring educational programs to align with participants' needs, particularly based on the time elapsed since an intervention, could significantly enhance their effectiveness and relevance.

Despite a growing body of literature on resilience interventions in nursing, no studies have systematically grouped or assessed the long-term effects of these interventions [10–13]. In contrast, a number of studies have focused on the short-term impact of resilience-building programs in healthcare employees, including nurses. These studies have been addressed in the recent reviews by Kunzler et al. [1,12], Delgado et al. [10], Henshall et al. [11], and Zhai et al. [13].

Therefore, the aim of this narrative review was to assess the evidence of the long-term impact of resilience-building intervention in nurses by investigating whether research studies evaluating resilience-building interventions included follow-up assessments at least once after the completion of the intervention. The assessment of any effects of resilience-building interventions in the long term is expected to add a new perspective regarding the effectiveness of resilience-building interventions. This is clinically meaningful since it will inform providers of resilience programs for the time frame during which they need to be applied. Potentially, future research can explore what characteristics these interventions need to have in order to be effective longitudinally. Based on these, the secondary objective of this review was to draw implications for critical care nurses.

## 2. Materials and Methods

### 2.1. Study Design

Since the general aim for conducting a narrative review is to summarize and map existing evidence on a research question in a form that is not explicitly systematic, this study design was applied as the most appropriate for the objectives of this review [14]. Specifically, the literature on the long-term impact of resilience-building programs in nurses has not yet been comprehensively reviewed, while relevant data seems to be heterogeneous and, thus, not suitable for a more precise systematic review [15]. Taking into account the lack of established protocols for conducting a narrative review, the assessment checklist of Baethge et al. [14] was applied herein. According to this protocol, the following research question was set: "What is the long-term impact of resilience building interventions in nurses?"

A literature search in terms of a systematic and organized manner was conducted from September to 15 November 2024 to identify studies assessing the effectiveness of

interventions designed to foster resilience in nurse, with a focus on those that included a long-term follow up period.

## 2.2. Data Sources and Search Strategy

The search was based on the following key-terms alone and in combination: “resilience or psychological resilience”, AND/OR “psychological adaptation” AND “nurses” AND “randomized controlled trial” AND “follow-up”. These terms were applied across multiple databases, encompassing EBSCOhost, MEDLINE, ProQuest, Google Scholar, PubMed, and Scopus. The search was conducted independently by the two authors, and the titles and abstracts of the articles were screened for inclusion and exclusion criteria. There were no disagreements, while cases of uncertainty were resolved with feedback from an expert in medical methodology.

## 2.3. Inclusion and Exclusion Criteria

Studies were included in the review if they met the following criteria:

- Published peer-reviewed Randomized Controlled Trials (RCTs) testing interventions specifically designed to enhance resilience in nurses (RCTs filter);
- Published in English (language filter);
- Measured resilience as an outcome using a standardized, structured, and validated instrument, specific to resilience;
- Included at least one follow-up assessment of resilience beyond the immediate post-intervention period, either as a primary or secondary outcome;
- Full-text access (filter)

There were no publication date-related limitations (no date filter).

The following studies were excluded:

- Studies that engaged nursing students and/or other healthcare professionals;
- Studies that qualitatively assessed the impact of resilience-building interventions;
- Studies that assessed resilience only once immediately after the completion of the intervention;
- Secondary studies and grey literature were not included.

## 2.4. Quality Assessment and Data Extraction

The quality of the included studies was assessed using the guidelines recommended by the Cochrane Collaboration [16], and a summary of the quality assessment results is provided in Table 1. The assessment was conducted independently by the two authors, and disagreements were resolved by consensus. We did not exclude any studies due to insufficient quality.

**Table 1.** Risk of bias assessment of the included studies (Cochrane tool).

| Included Studies | Random Sequence Generation (Selection Bias) | Allocation Concealment (Selection Bias) | Blinding of Participants and Personnel (Performance Bias) | Blinding of Outcome Assessment (Detection Bias) | Incomplete Outcome Data (Attrition Bias) | Selective Reporting (Reporting Bias) |
|------------------|---------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------------------------------------------------|------------------------------------------|--------------------------------------|
| [17]             | +                                           | +                                       | -                                                         | -                                               | -                                        | +                                    |
| [18]             | ?                                           | +                                       | -                                                         | -                                               | -                                        | +                                    |
| [19]             | +                                           | +                                       | -                                                         | -                                               | -                                        | +                                    |
| [20]             | ?                                           | +                                       | -                                                         | -                                               | +                                        | +                                    |
| [21]             | ?                                           | +                                       | -                                                         | -                                               | -                                        | +                                    |

Table 1. Cont.

| Included Studies                                  | Random Sequence Generation (Selection Bias) | Allocation Concealment (Selection Bias) | Blinding of Participants and Personnel (Performance Bias) | Blinding of Outcome Assessment (Detection Bias) | Incomplete Outcome Data (Attrition Bias) | Selective Reporting (Reporting Bias) |
|---------------------------------------------------|---------------------------------------------|-----------------------------------------|-----------------------------------------------------------|-------------------------------------------------|------------------------------------------|--------------------------------------|
| [22]                                              | ?                                           | +                                       | -                                                         | -                                               | +                                        | +                                    |
| - = High risk<br>? = Unclear risk<br>+ = Low risk |                                             |                                         |                                                           |                                                 |                                          |                                      |

Aiming to produce a high-level summary of the findings of the included studies, data were extracted based on the variables related to the present research question. These data are presented in Table 2. Subsequently, data extraction was followed by data synthesis in a descriptive and interpretative mode.

### 2.5. Selection of Eligible Studies

A total of 2500 studies were identified from the databases. After removal of duplicates, the titles and abstracts of 1200 studies were screened. Of these, 38 studies assessing the effectiveness of resilience-building interventions in nurses were full-text screened. Next, fifteen studies were excluded because they did not employ a validated resilience measurement tool to assess the impact of the intervention on resilience. Among the remaining 23 studies, only 8 included at least one follow-up assessment of resilience beyond the immediate post-intervention period. Yet, two of these studies were excluded due to insufficient reporting of resilience measurement results at the follow-up intervals. No relevant studies were identified via hand screening, while we did not search any journals by hand.

The selection process of the included studies described by a PRISMA flow chart [15] is presented in Figure 1.

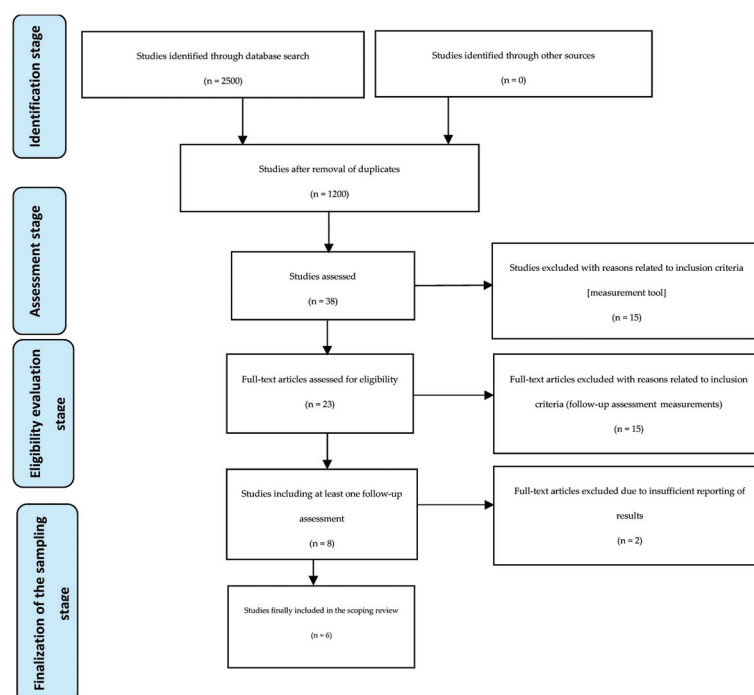


**Figure 1.** Map of sampling stations located in the Changjiang Ao area of Pingtan Island on 26 April 2022. Abbreviations for the sampling sites are as follows: ABA: Algal Bloom Area, TA: Transition Area, and NBA: Non-Algal Bloom Area.

Table 2. Randomized Controlled Studies included in the review in chronological order.

| Authors,<br>Year,<br>Country                                                                                                                                      | Aim/Setting and Participants                                                                                                                                                                                                                                                                                                                                                                                                                                               | Intervention Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Conceptualization of Resilience/Tool                                                                                                                                                                                                                                                                                  | Assessment/Findings                                                                                                                              |                                                                                                                                                   |                                                 |                                                |
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|                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                       | Pre-<br>Intervention                                                                                                                             | Post-Intervention                                                                                                                                 |                                                 |                                                |
| [17], 2015,<br>USA                                                                                                                                                | <b>Aim:</b> Examination of the outcomes of a brief Stress Management and Resiliency Training (SMART) program within a nurse orientation program.<br><b>Setting/Population:</b> Nurse orientation program at Mayo Clinic<br><b>Sample size:</b> 55<br>- <b>Intervention:</b> n = 27<br>- <b>Control:</b> n = 28<br><b>Age (mean)</b> = 28.16 years (SD: 8.29)<br><b>Sex:</b> 38 women, 2 men                                                                                | <b>Intervention</b><br><b>Delivery:</b> face-to-face lecture.<br><b>Description:</b> Presentation of a model of stress and resilience, integrating neuroscience and biology.<br><b>Duration of treatment period and timing:</b><br>a. Single 90 min session;<br>b. 1 h follow-up session after 4 weeks;<br>c. bi-weekly handouts via email.<br><b>Control</b><br><b>Delivery:</b> Lecture<br><b>Description:</b> Lecture related to stress, including reality shock and work-life connectedness.<br><b>Duration of treatment:</b> Single session.                                                                                   | SMART is designed to help participants understand the neuroscience and biology of stress.<br><br>Resilience is seen as a set of factors whose modification can be achieved using the 5 core principles of gratitude, compassion, acceptance, forgiveness, and higher meaning.<br><br>Connor-Davidson Resilience Scale | Baseline Assessment                                                                                                                              | Right after the completion of the program                                                                                                         | Short-term follow-up (3 months) (mean $\pm$ SD) | Long-term follow-up (6 months) (mean $\pm$ SD) |
|                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                       | Intervention group<br>79.68 $\pm$ 9.59                                                                                                           |                                                                                                                                                   | Intervention group<br>79.74 $\pm$ 11.82         |                                                |
|                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                       | Control group<br>74.76 $\pm$ 10.19                                                                                                               |                                                                                                                                                   | Control group<br>72.52 $\pm$ 8.83               |                                                |
| A two-sample <i>t</i> test comparing the change from baseline between groups found an estimated treatment effect (95% CI): 0.29 (2.15, 6.73) ( <i>p</i> = 0.302). |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                  |                                                                                                                                                   |                                                 |                                                |
| [18],<br>Canada                                                                                                                                                   | <b>Aim:</b> To test the effects of a wellness intervention (ARISE) on resilience, professional quality of life, and other outcomes, in critical care and trauma nurses.<br><b>Setting/Population:</b> A tertiary academic hospital in Toronto, Canada.<br><b>Sample size:</b> 29 nurses<br>- <b>Intervention group:</b> n = 16<br>- <b>Control group:</b> n = 13<br><b>Age (mean):</b> 33 years<br><b>Sex:</b> 90% female<br><b>Work experience in nursing</b> = 7.6 years | The intervention consisted of:<br>(1). One full-day interactive workshop with resilience-focused activities and<br>(2). Self-care techniques including mindfulness, stress relief using senses, yoga and stretches, and reflective writing, and a half-day interactive workshop which reinforced self-care techniques and introduced hospital resources for wellness and employee and family assistance.<br><br>A closed Facebook group was used to bolster workshop content workshops and provide peer support for 3 months.<br><br>Five 90 min instructor-guided mindfulness sessions were offered and archived for repeated use. | The CD-RISC was used to measure resilience at baseline, and 1 and 3 months after the intervention.                                                                                                                                                                                                                    | There was no difference in the change in CD-RISC scores from baseline between the intervention and control groups at 1 month ( <i>p</i> = 0.84). | There was no difference in the change in CD-RISC scores from baseline between the intervention and control groups at 3 months ( <i>p</i> = 0.26). | NA                                              | NA                                             |

Table 2. Cont.

| Authors,<br>Year,<br>Country | Aim/Setting and Participants                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Intervention Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Conceptualization of Resilience/Tool                                                                                                                                                                                 | Assessment/Findings                                   |                                                       |                                                       |                                                                                                                                                                                                                                                                                                                             |
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| [19],<br>China               | <p><b>Aim:</b> To evaluate the effects of a modified mindfulness-based stress reduction (MBSR) program on the levels of stress, affect, and resilience among nurses, in general, hospitals in mainland China.</p> <p><b>Setting/Population:</b> nurses from two tertiary-level general hospital</p> <p><b>Sample size:</b> 110 nurses</p> <ul style="list-style-type: none"> <li>- <b>Intervention group:</b> n = 55</li> <li>- <b>Wait-list Control:</b> n = 55</li> </ul> <p><b>Age (mean):</b> 31.50 years (SD: 6.90)</p> <p><b>Sex:</b> 84 women, 6 men</p>                                                                                                                                                                                                                                          | <p><b>Intervention</b></p> <p><b>Delivery:</b> Face-to-face group sessions</p> <p><b>Description:</b> Guided practice, education, dialogs around participants' observations of their feelings, thoughts, and body sensations.</p> <p><b>Duration of treatment period and timing:</b></p> <ol style="list-style-type: none"> <li>Eight 2-h weekly group sessions.</li> <li>20 min of formal mindfulness practice at home daily for 6 days a week for 8 weeks.</li> <li>Network Chatgroup through "WeChat" on mobile phones (sending PowerPoint slides, audio recordings of mindfulness exercises, questions and answers).</li> </ol> <p><b>Wait-list Control</b></p> <p>They were offered the intervention at a later date.</p>                                                                                       | <p>Modified mindfulness-based stress reduction (MBSR) program</p> <p>Resilience is seen as a set of factors whose modification can be achieved with training</p> <p>Connor-Davidson Resilience Scale</p>             | <p><i>Intervention group</i></p> <p>54.43 ± 11.46</p> | <p><i>Intervention group</i></p> <p>57.98 ± 11.58</p> | <p><i>Intervention group</i></p> <p>59.70 ± 11.87</p> | <p>NA</p> <p>NA</p>                                                                                                                                                                                                                                                                                                         |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                      | <p><i>Control group</i></p> <p>55.17 ± 11.85</p>      | <p><i>Control group</i></p> <p>55.11 ± 12.80</p>      | <p><i>Control group</i></p> <p>53.85 ± 16.21</p>      | <p>Significant differences in resilience were found between the two groups at the 3-month follow-up (<math>t = 1.95</math>, <math>F = 4.587</math>, <math>p &lt; 0.05</math>).</p>                                                                                                                                          |
| [20] USA                     | <p><b>Aim:</b> Investigation of the effectiveness of a short resiliency intervention focusing on sensory awareness on stress and resilience.</p> <p><b>Setting/Population:</b> Registered nurses at two tertiary care hospitals (including emergency department, operating room, intensive care units, specialty units, out-patient clinics, medical-surgical units)</p> <p><b>Sample size:</b> 196</p> <ul style="list-style-type: none"> <li>- <b>Intervention:</b> n = 99</li> <li>- <b>Control:</b> n = 97</li> </ul> <p><b>Age (mean):</b> 45.3 years (SD: 13.2)</p> <p><b>Sex:</b> 95% women</p> <p>Of the 196 nurses who completed baseline surveys and were randomized into treatment or control groups, only 77 (39.3%) came to a class and completed one or more of the follow-up surveys.</p> | <p><b>Intervention</b></p> <p><b>Delivery:</b> Face-to-face lecture, active engagement, discussion, demonstration, and participation, and various active experiences, such as skills stations. Access to the free CRM "ichill" app after the class.</p> <p><b>Description:</b> Psychoeducation / sensory awareness skills training class.</p> <p><b>Duration of treatment period and timing:</b> 3 h lecture</p> <p><b>Control</b></p> <p><b>Delivery:</b> face-to-face lecture, active engagement, discussion, demonstration, and participation, and various active experiences, such as mindful eating. Access to the free CRM "My Plate" app after the class.</p> <p><b>Description:</b> Lecture that covered topics related to nutrition / healthy eating.</p> <p><b>Duration of treatment:</b> 3-h lecture.</p> | <p>Trying to achieve the "Resilient Zone", an internal state of balance.</p> <p>Resilience is seen as a set of factors whose modification can be achieved with training.</p> <p>Connor-Davidson Resilience Scale</p> | <p><i>Intervention group</i></p> <p>29.65 ± 5.43</p>  | <p><i>Intervention group</i></p> <p>30.42 ± 3.35</p>  | <p><i>Intervention group</i></p> <p>30.94 ± 4.07</p>  | <p>NA</p>                                                                                                                                                                                                                                                                                                                   |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                      | <p><i>Control group</i></p> <p>28.82 ± 11.85</p>      | <p><i>Control group</i></p> <p>30.22 ± 5.32</p>       | <p><i>Control group</i></p> <p>31.00 ± 5.16</p>       | <p>Resilience significantly improved over time (<math>p = 0.004</math>). Post hoc tests performed for time within each group revealed significant effects for resilience (<math>F(3, 193.8) = 2.689</math>, <math>p = 0.048</math>), with no significant time effects for the control group (<math>p &gt; 0.10</math>).</p> |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                       |                                                       | <p><i>Intervention group</i></p> <p>31.72 ± 4.02</p>  | <p><i>Control group</i></p> <p>30.54 ± 4.99</p>                                                                                                                                                                                                                                                                             |

Table 2. Cont.

| Authors,<br>Year,<br>Country | Aim/Setting and Participants                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Intervention Description                                                                                                                                                                                                                                                                                                  | Conceptualization of Resilience/Tool                                                                                                                                                                                                                                                                           | Assessment/Findings                                           |                                                                   |                                                                 |                                                                 |                                                                 |
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| [21]<br>Germany              | <b>Aim:</b> Assessment of the improvement of mental health problems assessed by the General Health Questionnaire-28. Secondary outcome measures included self-reported indicators of resilience. Subjects were randomly assigned to either an intervention or a waiting list control group.<br><b>Setting/Population:</b> Nurses working in various medical departments (e.g., neurology, surgery, dermatology, etc.) and 30% critical care nurses in both groups.<br><b>Sample Size:</b> 72 nurses<br>- <b>Intervention group:</b> n = 38<br>- <b>Control group:</b> n = 34<br><b>Age:</b><br>Intervention group<br>mean = 47.4 (SD:10.8) years<br>Control group<br>mean = 46.5 (SD:10.4) years<br><b>Sex</b><br>Intervention group<br>35 women,<br>3 men<br>Control group<br>31 women<br>3 men | <b>Intervention:</b> an 8 weekly sessions of psychotherapy, two hours each held in group.<br>G.J., a psychologist in post-graduate psychotherapist, conducted all training sessions.<br>Cognitive behavioral therapy and psychodynamic and imagination exercises were included.<br>No blinding was involved in the study. | Self-reported indicators of resilience assessed with:<br>- The Brief Resilience Scale (BRS)<br>- the Connor-Davidson resilience scale(CD-RISC).<br>While the BRS conceptualizes resilience as the ability to recover from stress, the CD-RISC operationalises resilience as a composite of resilience factors. | (t0) was conducted one week before the first training session | Intervention group (BRS) 3.12 ± 0.32<br>(CD-RISC) 73.436 ± 12.38  | Intervention group (BRS) 3.73 ± 0.65<br>(CD-RISC) 72.03 ± 11.89 | Intervention group (BRS) 3.80 ± 0.58<br>(CD-RISC) 73.80 ± 12.75 | Intervention group (BRS) 3.79 ± 0.59<br>(CD-RISC) 71.12 ± 12.23 |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                | Control group (BRS) 3.08 ± 0.34<br>(CD-RISC) 70.40 ± 11.84    | Control group (BRS) 2.85 ± 0.50<br>(CD-RISC) 69.33 ± 12.35        | Control group (BRS) 3.45 ± 0.83<br>(CD-RISC) 69.81 ± 13.57      | Control group (BRS) 3.57 ± 0.78<br>(CD-RISC) 69.43 ± 13.16      | Control group (BRS) 3.57 ± 0.78<br>(CD-RISC) 69.43 ± 13.16      |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                | 70–73 &                                                       |                                                                   |                                                                 |                                                                 |                                                                 |
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The mixed model analysis revealed statistically significant group effects for the follow-up period (t1–t4) for resilience measured with the CD-RISC ( $\beta = 3.46$ ,  $t = 2.14$ ,  $p = 0.04$ ).  
No statistically significant group differences for the follow-up period were found for resilience measured by BRS ( $\beta = 0.07$ ,  $t = 0.66$ ,  $p = 0.51$ ).

Table 2. Cont.

| Authors,<br>Year,<br>Country | Aim/Setting and Participants                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Intervention Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Conceptualization of Resilience/Tool                                                                                                                                                                                          | Assessment/Findings                                                                                            |                                                                                                                                                                                                                                                                                                                      |    |
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| [22],<br>Australia           | <p><b>Aim:</b> To determine the effects of a resilience-building program on mental health nurses' coping self-efficacy (primary outcome), and psychological distress, well-being, resilience, posttraumatic growth, emotional intelligence behaviors, workplace belonging, and turnover intention (secondary outcomes).</p> <p><b>Setting/Population:</b> Registered and enrolled nurses working in clinical roles in a large tertiary metropolitan mental health service.</p> <p><b>Sample size:</b> 144 nurses</p> <p>- <b>Intervention:</b> n = 73</p> <p>- <b>Control:</b> n = 71</p> <p><b>Age groups</b></p> <p>Intervention group</p> <p>20 to 29: 25 (37%)</p> <p>30 to 39: 22 (32%)</p> <p>40 to 49: 13 (19%)</p> <p>50+, 8 (12%)</p> <p>Control group</p> <p>20 to 29: 17 (25%)</p> <p>30 to 39: 26 (39%)</p> <p>40 to 49: 9 (13%)</p> <p>50+, 15 (22%)</p> <p><b>Sex:</b></p> <p>Intervention group</p> <p>54 women (74%)</p> <p>19 men (26%)</p> <p>Control group</p> <p>50 women (70%)</p> <p>20 men (28%)</p> | <p><b>Content -Six modules</b></p> <ol style="list-style-type: none"> <li>1. identifying strengths and understanding resilience;</li> <li>2. understanding and managing stress;</li> <li>3. challenging and changing negative self-talk;</li> <li>4. drawing strength from adversity;</li> <li>5. promoting positive relationships and managing conflict; and</li> <li>6. creating solutions for well-being.</li> </ol> <p><b>Teaching methods</b></p> <p>Two 1-day workshops, delivered three weeks apart, and receive booster activities. Workshops were delivered face-to-face by two trained facilitators (experienced senior mental health nurses) in a peer-group setting.</p> <p>The program is using various teaching modalities including video clips, didactic sessions, small and large group discussions, and individual activities. Participants receive 'booster' activities via Short Message Service weekly, 10 min to complete.</p> <p>Delivery of the intervention comprised 23 individuals</p> <p>content units across the six modules. Fidelity checklists were completed by facilitators for each program, with each content unit assessed as: (1) Yes, delivered in full, (2) Yes, delivered in part, or (3) No.</p> | <p>Promoting Resilience in Nurses® program is underpinned by interpersonal theory, cognitive behavior theory and posttraumatic growth theory.</p> <p>Resilience was measured with the 6-item Brief Resilience Scale (BRS)</p> | <p><i>Intervention group</i> (BRS)</p> <p>3.37 ± 0.66</p> <p><i>Control group</i> (BRS)</p> <p>3.54 ± 0.74</p> | <p>Estimates and 95% confidence intervals for resilience, expressed as intervention minus control.</p> <p>0.30 (0.08 to 0.52) (<math>p = 0.009</math>)</p> <p>Estimates and 95% confidence intervals for resilience, expressed as intervention minus control.</p> <p>0.24 (0.01 to 0.46) (<math>p = 0.04</math>)</p> | NA |

Resilience improved and was sustained at 3 months with slightly smaller T3 estimates than T2.

### 3. Results

Six RCTs were included in the review. These studies tested the effect of a resilience-building program exclusively on nurses and reported at least one follow-up assessment of resilience beyond the immediate post-intervention period. The presentation of these studies is summarized in Table 2.

The study by Chesak et al. [17] evaluated the 90 min “Stress Management and Resiliency Training (SMART)” intervention, which was delivered within a nurse orientation program. A *one-hour-long follow-up session* and biweekly topic-related *email handouts* were provided. The control group received a single-session lecture on stress-related topics. Resilience scores improved in the intervention group and declined in the control group at the 3-month follow up. However, the group-by-time interaction, i.e., the resilience score change from baseline to the 3-month follow-up between the two groups, was not statistically significant ( $p = 0.302$ ).

Smith et al. [18] tested the ARISE intervention, designed to support critical care and trauma nurses at a tertiary academic hospital in Toronto, Canada. The intervention consisted of a *full-day workshop* (mindfulness, stress relief through sensory activities, yoga, stretches, and reflective writing), instructor-guided *mindfulness sessions*, and a *half-day follow-up workshop* aiming to reinforce these self-care techniques. Peer support was facilitated via a Facebook group for 3 months. Resilience was measured using the Connor–Davidson Resilience scale (CD-RISC) at baseline, 1 month, and 3 months post intervention. No significant differences in the trajectory of resilience change were observed between the intervention and control group at 1 month ( $p = 0.84$ ) or 3 months ( $p = 0.26$ ).

Lin et al. [19] investigated an *8-week modified mindfulness-based stress reduction (MBSR) program* targeting nurses in two general hospitals in mainland China. Resilience was measured at baseline, immediately post intervention, and at a 3-month follow-up. Although there were no changes in resilience immediately after the intervention, the difference between groups in resilience changes at the 3-month follow-up was statistically significant. Specifically, a significant group-by-time interaction effect was found in this study with nurses in the intervention group demonstrating significantly higher resilience scores at 3 months of follow-up compared to baseline in relation to the control group ( $p < 0.05$ ).

In the study by Grabbe et al. [20] participants in the intervention group attended a *3 h Community Resilience Model (CRM) session*, a sensory-focused mindfulness program. The control group attended a 3 h class on nutrition and healthy eating. Resilience was measured at baseline, one week post intervention, and at three months and one year. Although there was no significant group-by-time interaction, a significant time effect was observed in the CRM intervention group at 3 months, indicating moderate improvement in resilience (effect size,  $d = 0.39$ ). No improvements were reported at one week or one year.

Janzarik et al. [21] examined an *8-week psychotherapy program* for nurses working in various departments of a large German hospital. Assessments were conducted at baseline (t0), immediately (one week) post intervention (t1), and three (t2), six (t3), and nine months (t4) post intervention. The intervention group experienced significant improvement in resilience, with fewer mental health problems reported, compared to the control group. However, while group differences in resilience were statistically significant for follow-up assessments using the CD-RISC, no statistically significant differences were found when resilience was measured with the BRS.

The “Promoting Resilience in Nurses©” program was implemented by Foster et al. [22], in a large tertiary, mental health service in Australia. The six-module program was delivered in nurses by accredited facilitators. Resilience, measured using the six-item Brief Resilience Scale (BRS), was found to be statistically and significantly improved post intervention,

with greater group-by-time effect at the 3-month follow-up compared to the immediate post-intervention period.

#### 4. Discussion

The present study aimed to evaluate the long-term effects of resilience-building interventions in nurses, as measured via RCTs. This is particularly relevant, given the review by Kunzler et al. [12], which emphasized the importance of longer follow-up periods to better understand the efficacy of psychological interventions aiming to foster resilience. We identified only six studies that included long-term follow-up assessment of resilience. Of the six studies identified, five applied the CD-RISC tool as a resilience measurement tool, all of which demonstrated improvements in resilience scores at the 3-month follow-up [17–21]. Thus, one study, which solely used the BRS, reported statistically significant improvements of resilience at the 3-month follow-up [22]. However, in the study by Janzarik et al. [21] significant improvements in resilience at the 3-month follow-up were observed using the CD-RISC tool, but not the BRS.

This discrepancy is notable, as the CD-RISC tool focuses on assessing the availability of resilience factors, whereas the BRS evaluates resilience as an outcome [23]. These findings suggest that resilience development involves complex interactions between acquired skills and the capacity to apply them, which may evolve over time. Furthermore, the lack of sustained effect at longer follow-ups, such as one year, highlights the potential need for periodic reinforcement sessions to sustain resilience gains.

Our findings are supportive of the model proposed by Bonnano et al. [24], which examines resilience as a response over the course of time. Four elements are important in the appreciation of the temporal characterization of resilience: (a) baseline adjustment; (b) aversive circumstances; (c) post adversity resilient outcomes; and (d) predictors of resilient outcomes measured prior to, during, and after the aversive circumstances. For this reason, measuring resilience after an intervention requires longitudinal designs involving repeated and frequent monitoring of mental health, stressor exposure, and potential adaptations. The six studies included in this review, although limited in number, attest to the integration by investigators of the temporal approach in the study of variations in resilience after interventions. Assessing the outcomes in several timepoints after the completion of the intervention provides interesting information for the effectiveness of the intervention and the potential need for improvements according to different temporal adaptations of participants. Cross-sectional studies might overlook distinct trajectories of different subgroups on participants [9]. Also, despite previous reports of resilience interventions in nursing, only a few attempts to group and assess the long-term effects of resilience-building interventions are available [10–13].

Nevertheless, the present findings must be interpreted cautiously due to the limited number of included studies and the methodological heterogeneity among them. For instance, two of the studies employed longer interventions lasting 8 to 12 weeks [19,21], while others used shorter interventions, such as a single 90 min lecture [17], a three-hour-long session [20], or a full-day workshop [18]. It is worth mentioning that studies with longer interventions (i.e., beyond a single session) appear to have slightly more favorable results. Assuming this finding is confirmed in future studies, it will attest to the need for ongoing support for nurses. However, although Lin et al. [19] implemented longer interventions and employed a waitlist control group, this has been noted to potentially overestimate treatment effects, warranting careful evaluation of the conclusions drawn [25].

The present findings align with previous reviews, which have shown that while resilience-building interventions may enhance resilience immediately post-intervention, they often fail to produce lasting improvements in well-being [1,12]. Similarly, Zhai

et al. [13], in their meta-analysis, concluded that none of the reviewed studies provided sufficiently extended follow-up assessment to capture meaningful long-term effects. Future studies should prioritize long-term measurement intervals to more accurately assess the sustained impact of resilience interventions.

Additionally, most programs reviewed focused solely on individual-level resilience, overlooking the broader environmental and organizational context. The review by Kunzler et al. [12] faced similar criticism for drawing conclusions from interventions that failed to address resilience as a dynamic response influenced by environmental factors [26]. Organizational involvement and support are essential to enhance lasting resilience in healthcare professionals.

Despite the growing body of literature on resilience interventions in nursing [10–13], only a few studies specifically targeted critical care nurses. Exceptions include three pre-post studies [18,23,27], of which only one included a longer-term follow-up assessment [18]. In that study, no significant changes in resilience scores (CD-RISC) were reported between the intervention and control groups at 1 or 3 months post intervention. The other two studies assessed resilience only immediately after the intervention [23,27], finding improvements in resilience scores that may not persist without follow-up data. The interventions in these studies varied widely, ranging from a full-day workshop [18] to multi-session programs involving educational components workshop, counseling, mindfulness-based stress reduction, and exercise regimens delivered over 12 weeks [23], or five 90–120 min sessions covering resilience principals and development strategies [27].

Lastly, the present review underscored a critical gap in the literature: the lack of comprehensive assessments of individual risk for developing mental disorders following severe stress exposure. Vanhove et al. [28] observed that resilience interventions provided universally to employees, regardless of their risk profile, tend to have effects that peak immediately after training and diminish over time. In contrast, interventions targeted at high-risk employees demonstrate increasing effects over time, with greater benefits observed at the later follow-ups compared to immediately post intervention [28]. Future research on resilience-building in nurses should integrate individual risk assessment for mental health vulnerabilities and prioritize providing tailored support for those at higher risk.

### *Limitations*

Despite the valuable insights provided by this scoping review, its findings should be interpreted with caution due to the limited number of included studies and their methodological heterogeneity. These factors also limited the ability to perform a more sophisticated synthesis of the data. Indeed, the substantial variability among the reviewed studies poses significant challenges for direct comparisons of the programs, particularly regarding their content, duration, teaching methods, and the instructors' expertise and preparation. The use of multimodal interventions further complicates the ability to determine which specific components contributed to each program's efficacy. Additionally, methodological limitations of the primary studies affect the certainty and generalizability of the evidence in this review. One more notable limitation of the reviewed studies was the scarcity of data extending beyond three months post intervention, which restricts conclusions about the stability of observed effects over time and the potential need for booster sessions. Furthermore, the studies were constrained by small sample sizes and predominantly female participants, which limits the applicability of findings to a more diverse nursing population.

The exclusivity of RCTs and the restriction to publications in English represent additional limitations, as they may exclude relevant evidence available in other formats or languages. Also, the absence of data on potential work-related factors, such as salary and

shift work may be a limitation too. These unaccounted variables overlook the critical role that the work environment may constitute in influencing nurses' adaptive or maladaptive responses to stress and, subsequently, to resilience outcome. To address this, future research should evaluate environmental variables when assessing the efficacy of educational programs [29]. It is possible that resilience training alone may not be sufficient to achieve sustainable outcomes in a work environment that fails to meet the minimum standards of clinical practice [30]. As Kyranou [31] suggested, the broader clinical setting must be conducive to foster resilience. An additional limitation regards the fact that two studies were excluded from the present review due to insufficient reporting of the tools/methods applied in the post-intervention measurements, with no attempt to obtain these data from the researchers. Yet, since the general aim for conducting a narrative review is to summarize and map exiting evidence on a research question in a form that is not explicitly systematic, this limitation is not expected to crucially disempower the present findings. These highlight the need for future studies assessing the long-term impact of resilience-building interventions, also underscoring crucial points in designing such studies.

## 5. Conclusions

This narrative review highlights the very limited number of studies examining the long-time effects of resilience training in nurses, particularly in critical care settings. Some preliminary evidence points to the absence of sustained effect at longer follow-ups. As a result, professionals designing resilience-building interventions need to appreciate potential attrition effects not only in the number of people applying the intervention but also in the effectiveness of the intervention itself over time. Future studies could explore whether the provision of “booster” sessions, after the completion of the program, can improve resilience outcomes in the long run.

Interventions aimed at alleviating the stress experienced by hospital nurses and enhancing their resilience are likely to be pivotal in efforts to retain and support the nursing workforce. This is especially true in critical care settings, where the ever-changing and high-pressure nature of the work environment significantly amplifies occupational stress. A promising approach is the development of interventions that address both individual and organizational factors over time. Longitudinal strategies that integrate personal resilience training with systemic changes in the workplace environment may be more effective in promoting adaptive responses to severe or chronic work-related stress. Such comprehensive interventions could play a crucial role in building and sustaining resilience among nurses in the challenging context of healthcare settings.

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# Disempowered Warriors: Insights on Psychological Responses of ICU Patients Through a Meta-Ethnography

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**Abstract: Objectives:** to systematically examine and synthesize qualitative evidence on adult patients' psychological distress during an intensive care unit stay to inform development of interventions tailored to their needs. **Method:** We conducted systematic literature searches in CINAHL, MEDLINE, EMBASE, PsycINFO, Scopus, Dissertations and Theses Global, and Google Scholar databases using predefined eligibility criteria. We synthesized primary qualitative research evidence using Noblit and Hare's meta-ethnographic approach. Reporting was based on the eMERGe framework. The quality of included articles was assessed by the Critical Appraisal Skills Program tool. **Findings:** We identified 31 primary studies from 19 countries. The studies were of moderate to high quality. Data analysis revealed five themes: "disempowerment", "altered self-identity" "fighting", "torment", and "hostile environment". One overarching theme, "the disempowered warrior", captured the perpetual tension between the need to fight for their lives and the need to succumb to the care process. Our synthesis discloses that critically ill patients perceive themselves to be in a battle for their lives; while at the same time they may feel helpless and disempowered. **Conclusions:** Our review revealed the tension between the need to fight for one's life and the sense of powerlessness in the intensive care unit environment. Although participants recognize the important role of healthcare workers, they desired more involvement, collaboration, control, empathy, and empowerment in the care process. These findings can inform approaches to empowering critically ill patients and managing their psychological responses. Care standards must include distress assessment and management that maximize patients' empowerment and emotional safety with the care process.

**Keywords:** psychological distress; intensive care experience; disempowerment; inclusivity; quality of care

## 1. Introduction

For many patients, an intensive care unit (ICU) hospitalization is associated with varied psychological responses to distressing events, including the fear of death, traumatic memories, and facing an uncertain future [1–3]. Adverse psychological responses during ICU hospitalization may contribute to mental health impairments after discharge from the ICU, including anxiety, depression, and post-traumatic stress symptoms [4]. Overall, 45% of post-ICU patients experience mental health problems following ICU hospitalization [5]. Mental health problems may also interact with and aggravate other manifestations of

the post-ICU care syndrome (PICS), a condition characterized by physical, cognitive, and mental deterioration [6]. Patients' quality of life may diminish, and the risk of dying increases within the first two years after discharge in patients affected by PICS [7].

Although the psychological and mental impact of stress during ICU hospitalization requires ongoing assessment and management [8,9], there are still no clinical practice guidelines or best practices for the tailored assessment and management of psychological distress in the ICU. Moreover, the role of nurses and bedside healthcare personnel regarding the management of relevant needs remains unclear [10,11]. Despite several qualitative studies focusing on patients' lived experience of ICU hospitalization, no systematic syntheses of their' perspectives and experiences of psychological distress exist. Therefore, we undertook a meta-ethnographic synthesis of available qualitative evidence on patients' experiences and perceptions of psychological distress in the ICU. This work has implications for navigating nurses' role in managing ICU-related psychological distress and relevant stressors, improving the overall quality of the ICU experience, and ultimately reducing healthcare spending on psychological and mental health-related adverse post-ICU outcomes [12].

### *Objective*

We aimed to systematically identify and synthesize qualitative evidence on critically ill patients' experiences of psychological distress during their ICU hospitalization, and its impact on individuals' perceptions and meanings of self and of their disease.

## **2. Methods**

We pursued a meta-ethnographic synthesis of data premised on Noblit and Hare's seven steps for a cumulative analysis of qualitative data [13]. The interpretive nature of meta-ethnography enables the integration and synthesis of concepts across diverse studies, facilitating a more nuanced theoretical comprehension of ICU experiences by identifying novel insights and generating higher-order constructs. This method was therefore chosen to gain a deeper understanding of the psychological responses and related adaptive mechanisms in ICU patients by translating and synthesizing findings across studies [14].

Our meta-ethnographic approach involved seven steps: defining the research question (Step 1), deciding what was relevant through a systematic database search and a quality appraisal (Step 2), synthesizing included studies and translating articles into one another (Steps 3–6); and reporting findings of the synthesis with the eMERGE framework (Step 7) [14] (Table 1). The review was guided by the following question: "What are adult ICU patients' experiences, interpretations, and manifestations of psychological distress while in the ICU and its impact on individuals' perceptions and meanings of self and of their disease?" Below we present the components of the research question using the SPIDER format [15].

**Table 1.** Research question according to the SPIDER format.

|                        |                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample                 | Adult patients hospitalized or discharged from the ICU, who experienced psychological distress during ICU hospitalization.                                                                                                                                                                                                                                                                          |
| Phenomenon of Interest | Psychological distress during ICU hospitalization.<br>Psychological distress is defined as a subjective experience of discomfort and stress, which may also include a sense of demoralization, the experience of feeling broken or mental pain, a sense of anguish, symptoms of somatization and cognitive alterations, feelings of anger, self-perceived lack of control, and self-criticism [16]. |

Table 1. Cont.

|               |                                                                                                                                                                                                                |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Study Design  | Any type of qualitative research design (i.e., phenomenology, grounded theory, and ethnography) utilizing any type of qualitative data collection (i.e., interviews, focus groups, journals, and field notes). |
| Evaluation    | Experiences and/or perspectives and/or interpretations of psychological distress in the ICU and its impact on individuals' perceptions and meanings of self and of their disease.                              |
| Research type | All types of published qualitative research papers and accessible grey literature. Mixed method studies with rich qualitative data were also included.                                                         |

### 2.1. Eligibility Criteria

Guided by the SPIDER tool, we included peer-reviewed qualitative studies of empirical data, published in English since 2002, on ICU patients  $\geq 18$ , and addressed the following: (i) psychological responses during ICU hospitalization regardless of when data were gathered (i.e., within or post-ICU), and (ii) patients' interpretation of psychologically distressing experiences. We excluded reviews, conference papers, abstracts without full text, discussion/opinion papers, and book chapters. Papers that addressed psychological responses of healthcare workers, infants, children, and families were also excluded. We retrieved articles published from 2002 onward, as the first ICU agitation and sedation guidelines were published in 2002 [17], and thus the context of critical care may have been different prior to 2002.

### 2.2. Information Sources and Search Strategy

In collaboration with the research team, an experienced health sciences librarian designed and executed our search strategies for each database. The searches were last updated in August 2024. We searched the following six electronic databases: (1) Medline via OVID, (2) EMBASE via OVID, (3) PsycINFO via OVID, (4) CINAHL via EBSCOhost, (5) Scopus via Elsevier, and (6) Dissertations and Theses Global via ProQuest.

The search strategy for each database was derived from two main concepts; (1) adult ICU patients; and (2) psychological responses, including language for anxiety, fear, and stress disorders such as post-traumatic stress disorder. A combination of natural language keywords and controlled language subject headings were used to construct the search strategy for each database (Tables A1–A6). We completed forward citations using Scopus and reviewed reference lists of included articles to identify potential articles.

### 2.3. Selection of Sources of Evidence and Data Charting

Retrieved articles were exported into the Covidence software ([www.covidence.org](http://www.covidence.org)) for data management, removal of duplicates, and independent screening. Two team members independently screened titles and abstracts for eligibility, and conflicts were resolved with a third reviewer. Inter-rater reliability was achieved through a mutual agreement on the type of studies to be included.

### 2.4. Quality Assessment

Two authors independently used the Critical Appraisal Skills Program [18] qualitative studies checklist to identify methodological shortcomings of this body of literature and to inform the synthesis and discussion. The CASP qualitative checklist addresses the validity, methodological coherence, and significance of a study.

### 2.5. Data Extraction and Analysis

We developed a data extraction tool based on the review questions, which was iteratively enriched through familiarization with the evidence. Two reviewers independently

extracted data to ensure rigor and reliability. Disagreements were resolved through discussion and, when necessary, by consulting with the team to reach a consensus. The analysis team comprised five researchers, including two nursing professors, two Ph.D. students, and one Master of Nursing-prepared nurse. Team members read the included studies and independently developed interpretation themes. The development of high-order interpretation was achieved through team effort. During this phase, the team met virtually, and contributions from team members' interpretative reading of findings were compared to ascertain the meaning of the conceptual data in a high-level interpretation (third-order constructs). The emerging themes were confirmed through consensus. In meta-ethnography, the concept of saturation is adapted to the context of synthesizing existing research rather than collecting new data. In our study, saturation was used to ensure conceptual clarity, that is, that the synthesis addressed the research questions adequately and represented the breadth and depth of available research data, while additional analysis did not contribute to the emerging themes [13,14].

### 3. Results

A total of 4862 articles were screened, out of which 4775 were excluded. We assessed 87 full-text articles based on the eligibility criteria and 31 studies met the inclusion criteria (Figure 1: PRISMA chart).

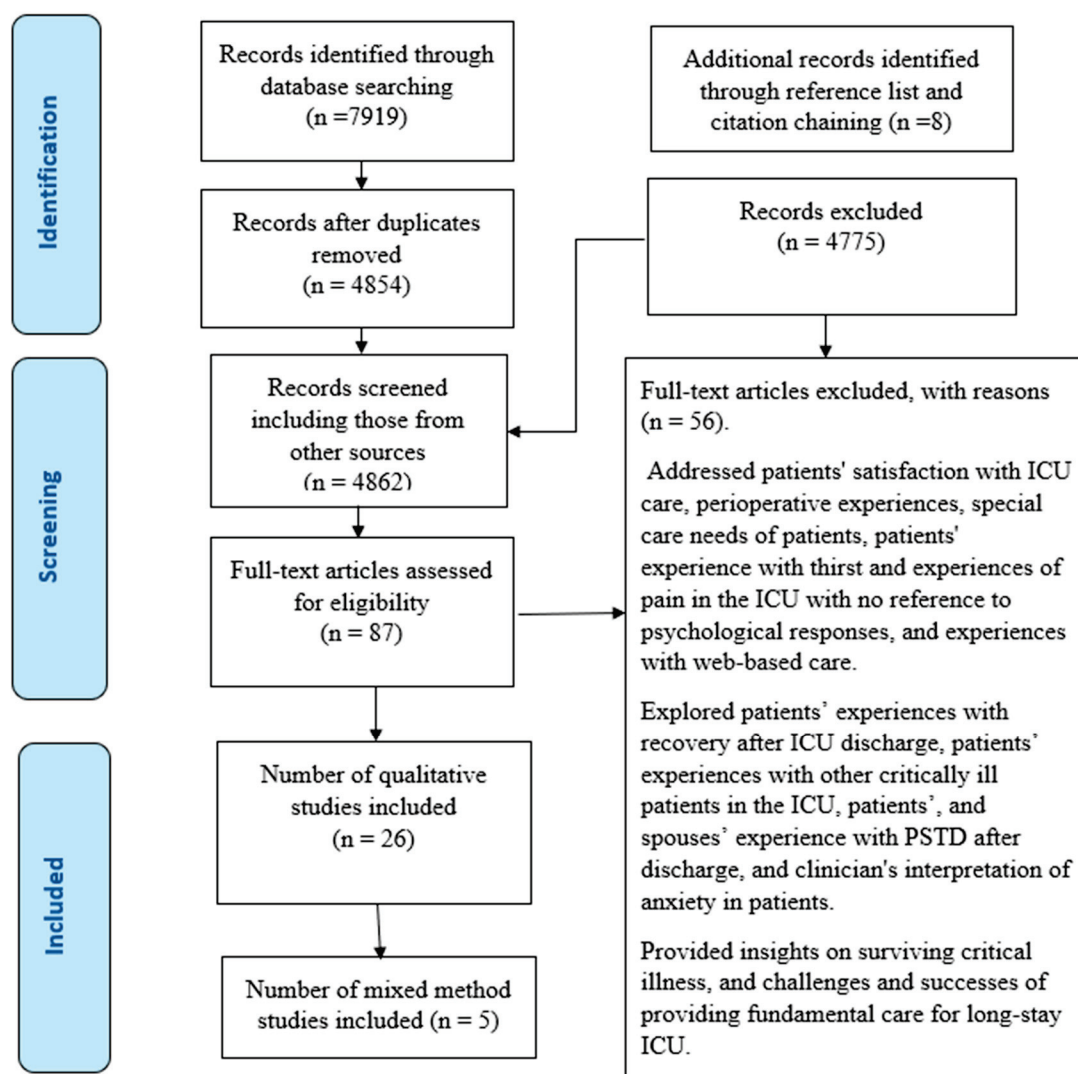


Figure 1. PRISMA chart for meta-ethnography review.

### 3.1. Study and Participants' Characteristics

A total of 31 studies from 19 countries were synthesized (Figure A1). Table 2 provides a summary of the selected studies. The results of second- and third-order analysis (Table A7). A wide range of methodological and theoretical perspectives were employed in the reviewed studies (Figure A2). Most of the studies ( $n = 21$ ) were conducted in medical and surgical ICUs (Figure A3). The included studies varied in terms of ICU context across countries, including factors such as ICU design, nurse-to-patient ratios, and the standardized ICU protocols/treatment strategies. However, no studies reported information on the ICU context. Participants included in the primary studies were aged between 20 and 88 years. In most studies, the majority of participants were male (Figure A4), with no neurocognitive or psychiatric limitations, and mechanically ventilated during their ICU stay (Table 2 and Figure A5). The psychiatric history and cognitive status of participants were unreported in most studies [2,3,19–29]. Some participants experienced delusions, delirium, and/ or hallucination during ICU hospitalization [23,26,29–35].

### 3.2. Quality Appraisal

The studies were of moderate to high quality; yet some did not adequately disclose the researchers' relationship with participants or address the potential influence of researchers' bias and positionality on data collection and interpretation (eight studies) (Table 3).

### 3.3. Experiences of the Participants in the Reviewed Studies

Data analysis revealed five themes: "disempowerment", "altered self-identity" "fighting", "torment" (with subthemes "trauma" and "fear of death"), and "hostile environment" (Figure 2). One overarching theme, "the disempowered warrior", emerged from the culmination of these themes and captured the perpetual tension between the need to fight for their lives and the need to succumb to the care process. The themes with participants' quotes are illustrated in Table 4.

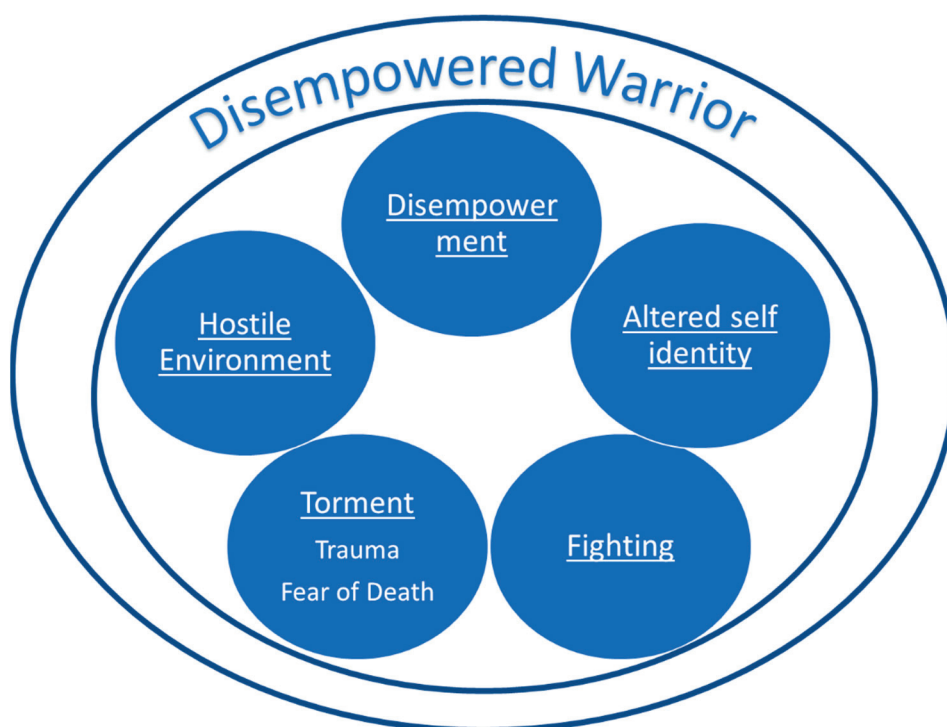


**Figure 2.** Emerging themes and synthesis.

## The Disempowered Warrior

The overarching theme, *“the disempowered warrior”*, captures participants’ perceptions of the simultaneous urgency to fight for their survival and an overwhelming sense of helplessness. The ICU care equipment and process of care seemed to threaten their sense of stability, safety, and personal identity. Although participants described their struggle to return to their pre-ICU state, they felt that the ICU system disempowered and dehumanized them, making it difficult to effectively confront the challenges of critical illness and its care. Although they perceived themselves to be in a constant battle for survival, their agency over their fate was unacknowledged: *“You become very anxious, it is like you are fighting for your life, . . . you are just getting instructions push, breath or whatever. . .”* [19]. The themes that culminated into this overarching theme are described below:

### Disempowerment

Disempowerment was predominantly linked with participants’ perceptions of being deprived of their rights and experiencing dehumanization: *“[. . .] I’m not an engine that needs to be fixed, I mean, I’m a human being”* [36]. Many described that they lost control [25,34,37]: *“Being in the ICU is just like a little child who could not swim [and] was thrown into a cold swimming pool”* [29] and perceived that they could not influence care decisions [25]: *you know, not giving updates [. . .] you just struggle. You feel so helpless [. . .]”* [34].

Furthermore, participants described a loss of autonomy in several instances, including the right to information, to keep personal or religious items, to adequate physical, psychological, and spiritual care, and to dignity [3,19,24,25,38,39]. Frustration due to experiences of power imbalance was evident: *“when they put this and that on me, I was very annoyed, but I must give in. Being in the status as a patient makes [patients] passive, meaning we have to put utmost trust on doctors and nurses. Our lives are in their hands”* [24]. Some participants wanted to challenge uncomfortable care processes or influence care decisions but felt powerless to do so. They perceived that they were helpless in diseased bodies [25,38]. Others felt *“like a vegetable. . . very defenseless and helpless”* [40]. Nevertheless, participants desired to be acknowledged as humans by healthcare workers [12,35,36,41]. Specifically, participants sometimes perceived staff attitudes as neglectful rather than indifferent [3]: *“You. . . [ring] the bell and no one shows up. [. . .] It made me feel helpless, and powerless. . . what can I say, you feel hurt and you could easily start to cry”* [36]. Participants also felt that their concerns were invalidated, dismissed, or not taken seriously, further undermining their dignity [25,36]: *“You want to be treated as an adult instead of a child, right? [. . .]”* [36]. Across studies, participants described not receiving timely explanations or updates about their condition, care plan, or prognosis [20,25,26,29,36], as one participant explained: *“you know, not giving . . . updates . . . you just struggle. You feel so helpless, and you wonder if you are going to die”* [34]. This lack of information often led to death anxiety, delusions, and sometimes paranoia about healthcare staff’s intentions [31]. For instance, in Wang et al.’s (2009) study, the following was shared: *“someone pressed my arms and legs forcefully, some others opened my mouth and put something into my throat, after that I knew that was the tracheal tube, why did nobody tell me about it before that?”* [29].

Regarding dehumanization, participants described vivid experiences of depersonalization, and their desire to be understood and recognized as human beings [12,35,36,41]. McKinley et al., (2002) noted that depersonalization occurred when staff treated patients as objects, or talked about them as though or not they were not present, especially during ward rounds [26]. Overpowering noise from staff conversations or laughter further contributed to the perception of impersonal care [27,35,36,41]. Participants recalled the following: *“we were lying on bed like vegetables, it seemed that we did not exist to the nurses, they were chatting and laughing, too noisy”* [29], or *“There were moments when [patients] almost cried*

*in despair. [They were] suffering and [care practitioners] laugh[ed] at the top of their lungs a few meters away” [33].*

### Altered Self-Identity

Participants described significant alterations in their perceptions of self, body, and competencies, with the loss of self-care abilities being central to this altered perception of self-identity [29,35]. Many participants felt vulnerable due to extreme physical and emotional dependency on care providers, medical equipment, and technologies [1,24–26,29,33–35,42]. This reliance on technology led them to feel as though their physical existence was controlled by machines [24,25], sparking insecurities about losing their sense of self [24,36]. Specifically, dependence on life-sustaining technology affected their perception of their bodies, which they described as “freakish” and incapable of performing normal functions [3,20,24,37]: *“Weak in [the] body . . . [some] felt like a child, . . . who doesn’t think too much, can’t do anything; can’t pee by . . . self, poo by . . . self, can’t do anything” [25].*

The loss of functional independence led participants to worry about whether they would ever regain it [3,20,22,23,31,41]: *“when I woke up from the coma the only thing that I confronted was fear, i.e., if I would be able to speak again because of the tracheotomy and if I would be able to walk again because I was confined in my bed. . .” [3].*

Many studies underlined feelings of embarrassment and loss of dignity due to the inability to perform self-care functions, such as toileting, eating, and drinking, [19,21,26,33,38] as a loss of personal dignity [19,33]. Ashkenazy et al. (2021) interestingly noted that the level of embarrassment varied according to participants’ beliefs and values [38].

Perceptual distortions, including hallucinations and delusions, further affected participants’ sense of time, space, and interactions with care providers [3,21,27–29,31,33,35,36,40,41]. Some participants described themselves as becoming introspective or paranoid whilst in the ICU [3]. The lack of social connections, which were deemed as essential for nurturing their identity, further deepened these distressing experiences [19–21,27,28,34,37,38,40].

### Fighting

The notions of battle and fighting for survival were evident throughout participants’ narratives, and they underscored their perceptions of trauma and fear of death. Participants fought not only for their survival, but also to be heard and understood by the care team and to maintain their psychological equilibrium.

When healthcare providers focus solely on implementing care routines and achieving predefined healthcare goals, patients often perceive the experience as distressing and oppressive, intensifying their fight for survival [3,36,40,43]. This exclusive focus on physical interventions can overshadow the need for clear communication and emotional support, leaving patients feeling fearful, abandoned, and misunderstood. One patient expressed the sense of neglect, stating, *“I am sure that they want to hurt me, and nobody explains to me what has happened. The only thing that they cared about is my coughing” [3].* These experiences highlight the centrality of psychological well-being in the fight for survival. Another participant described experiences of anxiety, likening it to a constant battle for life: *“You become very anxious, it is like you are fighting for your life, . . . you are just getting instructions push, breath or whatever. . .” [19].* Patient narratives emphasized the need for compassionate care that addresses both the physical and emotional dimensions of patient experiences [19,43]. Without such support, the ICU becomes not just a place of medical intervention, but a site of profound psychological distress, intensifying the patient’s trauma. The profound disorientation and helplessness of the ICU environment are captured in the analogy, *“Being in the ICU is just like a little child who could not swim [and] was thrown into a cold swimming pool” [29].* Additionally, patients perceived lack of support in their fight for their lives.

A patient detailed how emergency procedures in the ICU worsened personal distressing experiences: *“when a patient becomes ill, the ward falls apart, all the doctors and nurses are gone [leaving other patients] subconsciously restless and upset”* [2].

### Torment

Admission to the ICU inflicted suffering and feelings of imprisonment, as noted in five studies from Jordan, Iran, Italy, China, and Greece [3,12,29,39,42].

Participants used expressions such as horrible, martyrdom, entombed, jail, and hell [1,3,29,34,42] to communicate their ICU experiences: *“Like a prisoner with tied hands and feet and closed mouth who is continually punctured with needles and cannot say anything”* [42]. Thus, care routines were often conceptualized as torturous and impersonal [3,19,26,37,42]. For instance, experiencing immobility, instrumentation, intubation, painful medical procedures, or being restrained in the ICU translated into feelings of terror, confinement, agitation, and isolation [1,3,34,41,42]. Indeed, participants often shared an overwhelming feeling of loneliness: *“an infinite sense of loneliness as the most negative feeling”* [3], describing that that loneliness could make *“you die in bed”* [19]. Furthermore, loneliness was exacerbated when care providers focused more on technology than on the participants, underscoring their need for greater connection with people around them [27,28,37–39].

Discomfort from intubation and extubation were also described as oppressive, and most participants could not withstand the emotional and physical discomfort of endotracheal suctioning [12,19–21,27,28,34,35,40,42]. Participants *“waited for this torment to end”* (Zisopoulos et al., 2022), as *“it was one of those things that you have to kind of grin and bear it”* [3].

### Trauma

Participants interpreted their illness and care context as extremely stressful and traumatic, not only for themselves, but also for their spouse, children, and loved ones [12,22,27,34,41,43]. They reported a myriad of emotional responses: fear, worry, anxiety, sadness, sorrow, despair, disappointments, grief, aversion, loneliness, and insecurity [3,12,19–22,25,27–29,34–37,40,42–44]. In a study in Iran, the experience of waking up in an ICU was described as tremendously terrifying: *“to be honest, everyone who wakes up and does not know where he is and once sees all these devices hooked to him and cannot do anything, is definitely going to have another MI [myocardial infarction] from fear”* [20].

Participants worried about their prognosis and risk of disability [12,22,27,34,39,41,43]. They also feared developing complications such as mouth ulcers or breathing problems from invasive respiratory procedures [12,19–22,25,27–29,34,36,37,40–43]. Participants sometimes received contradictory statements about their conditions and hopes for treatment which made them more confused and vulnerable [2,3,19]. *“Today, the doctor comes and says that the operation was very good, you will get up soon and you will not have any special complications. Tomorrow another doctor will come and say that it is too early for me to comment. Maybe you will have a series of complications after the operation!”* [2]. These experiences were not different from what was expressed in a Greek and a South African study: *“There is a lot of can’t... you can’t do... so all of these accumulate to a bad experience”* [19]; *“From the moment you woke up you wanted to get out, to flee, you don’t want to stay even a minute longer”* [3].

### Fear of Death

Participants associated admission to ICU with the risk of death: *“I was very scared when I realized I was in the ICU. I told myself I was done!”* [2]. Another participant described: *“when I woke up I found a tube in my throat, [...] I could not stop thinking: Was I dying soon?”* [29]. These narratives were echoed in most participants’ stories [1,27,28,35,37,39,42]. Reports of death anxiety also stemmed from witnessing or hearing about the death of other patients *“We were four and I was the only one left. Three*

died, and I saw them die. . . It was not easy holding on to the bed waiting for your moment to come” [20,33,37]. Some patients willfully desired to die to end their suffering [24,42]. One participant explained, “I have no fear of dying, but always of being in pain and suffering. . . the same pain, I would like to die instead. . . I thought that if (I) didn’t die soon, it would be pitiful” [24].

### Hostile Environment

Participants perceived the care environment as hostile and traumatic, and they felt the need to fight for their lives, and, at the same time, to resist perceived harm. The ICU was also described as *“an artificial environment, inappropriate to the human being, [and] not compatible with human expectations”* [33]. The participants also experienced exhaustion and reduced quality of life from the ICU environment. Sounds and lights were described as tormenting [1,3,12,25–27,29,36–38,40,41]. They described that *“for almost the entire [time], all the lights were on, there was no window, no clock, and [patients] didn’t have a sense of time”* [3] and in effect contributed to the hostility of the environment [35,37,41]. Consequently, some participants became tired and wary of their situation: *“can hear all of it. . . it’s hard to explain but if you can’t sleep, can’t shut yourself down so to speak, and being afraid of all that may happen makes you scared. Yes all that makes you feel. . . I can’t hang on anymore”* [36].

Technology was perceived as both maintaining their life and a constant source of anxiety and fear, as participants tried to interpret if the cues from the machines surrounding them signaled threats. Participants also dreaded experiencing technology failure or being harmed by technology [20,24,25,37]: *“I kept thinking of this: What should I do if there was anything wrong in the machine without someone knowing? Was that my last day of life?”* [36]. As their stress was perpetuated, some participants demonstrated a form of resistance to care [19,23,29,36,38]. For instance, Gilder et al., (2022) [23] noted a case of a patient being panicky, biting the endotracheal tube and trying to pull the tube out. Wang et al., (2009) [29] described that some participants were resistant to the equipment and technologies used for treatment due to the discomfort and suffering that came with them. One patient shared: *“I did not know what is going on, I woke up, I felt a tube, I thought maybe I will pull a little bit, suddenly I saw the tube halfway out, so I took it out”* [38].

**Table 2.** Summary of included studies.

| Authors and Country                  | Aim                                                                                                                                                     | Sample Characteristics                                                                                                                                                                                                                | Themes                                                                                                                                                                                                                                                       |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Adeyemi (2016) [19]<br>South Africa  | To explore and describe the experiences of patients on mechanical ventilation in the intensive care unit of one public sector hospital in Johannesburg. | Female = 4, male = 6.<br>Age = 39–48 years.<br>Average length of stay in ICU (LOS): 4.9 days.<br>Cognitive status: not reported.<br>Mean duration on mechanical ventilation = 57.45 h.<br>Sedation status: all patients were sedated. | <ul style="list-style-type: none"> <li>• Experience of fear</li> <li>• Feelings of bothering</li> <li>• Powerlessness</li> <li>• Sense of safe/unsafe</li> <li>• Body image</li> <li>• Spirituality</li> </ul>                                               |
| Albanesi et al. (2020) [12]<br>Italy | To describe the lived experiences of patients who underwent cardiac surgery.                                                                            | Female = 9, male = 2.<br>Age = 42–75 years.<br>Cognitive status: consciousness.<br>Ventilation status: not reported<br>Sedation status: One patient described being on sedation.                                                      | <ul style="list-style-type: none"> <li>• Endless time in ICU</li> </ul> <i>“trapped”, “in prison”, and “not understanding time”</i> <ul style="list-style-type: none"> <li>• Anchor in the storm</li> </ul> Presence of nurses, sense of security, and trust |

Table 2. Cont.

| Authors and Country                          | Aim                                                                                                                                                                            | Sample Characteristics                                                                                                                                                                                                                            | Themes                                                                                                                                                                                                                                |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alpers et al., (2012) [43]<br>Norway         | To gain knowledge on what factors contribute to inner strength in critically ill patients cared for in an intensive care unit.                                                 | Female= 3, male =3.<br>Age = 60–72.<br>Ventilation and sedation status not reported.                                                                                                                                                              | <ul style="list-style-type: none"> <li>To have the support of next of kin</li> <li>The wish to go on living</li> <li>To be seen</li> </ul>                                                                                            |
| Ashkenazy et al., (2021) [38]<br>Israel      | To describe mechanically ventilated ICU patients' perception of discomfort and how they differentiate discomfort from pain.                                                    | 1 males, 3 females.<br>Age 19–81 years.<br>Ventilated for 2–8 days.<br>LOS 3–20 days.<br>Participants were fully conscious, oriented, and able to articulate their ICU experience.<br>Most interviews were conducted 3–8 days post ICU discharge. | <ul style="list-style-type: none"> <li>Unpleasant physical sensations</li> <li>Unpleasant psychological feelings: Embarrassment, helplessness, loneliness, and fear</li> </ul>                                                        |
| Aslani et al., (2012) [20]<br>Iran           | To explore the psychological experiences of patients under mechanical ventilation following an open-heart surgery in 2016.                                                     | Female = 8, male = 7.<br>age range = 40–60.<br>Cognitive status: not reported.<br>All patients had received ventilation.<br>Sedation status: all patients were sedated.                                                                           | <ul style="list-style-type: none"> <li>Anxiety, fear, despair, and dependency</li> <li>Spiritual connection</li> <li>Presence of treatment team, communication</li> <li>Family (presence, praying)</li> </ul>                         |
| Engström et al. (2012) [21]<br>Sweden        | To describe the intensive care unit experiences of people undergoing mechanical ventilation.                                                                                   | Female = 4, male = 4.<br>Age = 45 to 72 years.<br>Ventilation status: 5–21 days.<br>Sedation status: all patients were sedated. Duration on sedation not specified.                                                                               | <ul style="list-style-type: none"> <li>Feeling vulnerable and dependent</li> <li>Struggling to be able to communicate</li> <li>Feeling safe with the staff</li> <li>Appreciation of the diary and follow-up visit</li> </ul>          |
| Eqylan et al., (2022) [39]<br>Jordan         | To explore critically ill Muslim patients' experiences and perceptions related to confinement to isolation rooms in Jordan.                                                    | 5 male and 5 female.<br>Mean age: $42.2 \pm 17.3$ years.<br>Mean duration of isolation stay: $6.6 \pm 2.2$ days.<br>Included only patients not ventilated or sedated.                                                                             | <ul style="list-style-type: none"> <li>Feeling isolated and imprisoned</li> <li>Losing basic patients' rights</li> <li>Feeling rejected by healthcare providers</li> <li>Accepting isolation and its adversity</li> </ul>             |
| Flahault et al., (2021) [30]<br>France       | To capture the intimate experience of ICU patients, to understand how they make sense of this experience, and to explore their experience and representations of an ICU diary. | 3 men and 2 women.<br>Age: 24–72 years.<br>LOS: 8–13 days.<br>Duration of mechanical ventilation: 4–9 days.<br>Patients experienced delirium and hallucinations during admission.                                                                 | <ul style="list-style-type: none"> <li>The nightmare of the ICU experience</li> <li>The positive image of healthcare workers during intensive care</li> </ul>                                                                         |
| Foster et al., (2010) [22]<br>United Kingdom | To describe the experience of having a tracheostomy tube as lived by a group of people who had this tube inserted as a part of their critical illness or as a procedure.       | Female = 1, male = 2.<br>LOS $\geq 14$ days.<br>Cognitive and mechanical ventilation status not reported.                                                                                                                                         | <ul style="list-style-type: none"> <li>Necessity of communication</li> <li>Retaining normality</li> <li>Psychosocial discomfort</li> <li>Painful procedures</li> <li>Relationships with staff</li> <li>Fear of the unknown</li> </ul> |

Table 2. Cont.

| Authors and Country                             | Aim                                                                                                                                                          | Sample Characteristics                                                                                                                                                                                                                                                                                          | Themes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gilder et al., (2021) [23]<br>New Zealand       | To describe the patient experience of the endotracheal tube and suction, following mechanical ventilation in post-operative cardiac surgical patients.       | Eight male, two female.<br>Age: 26–84, mean = 64.1 years.<br>LOS: mean = 24.5 h, range = 17–72 h.<br>Duration of mechanical ventilation: mean = 6.3 h range = 4.1–17.4 h.                                                                                                                                       | <ul style="list-style-type: none"> <li>• Hallucinations and the effects of drugs</li> <li>• Feeling good about recovery</li> <li>• Slow passage of time and sleeping issues</li> <li>• Anxiety and concerns about the future</li> </ul>                                                                                                                                                                                                                                                                     |
| Herbst and Drenth, (2012) [32]<br>South Africa  | To increase insight into the thoughts, feelings, and bio-psychosocial needs of the patient receiving treatment in the ICU.                                   | Single participant 27 years old female.<br>Participant regained consciousness. after three weeks in the ICU.<br>Ventilated and sedated but number of days involved not reported.<br>LOS: not reported.                                                                                                          | <ul style="list-style-type: none"> <li>• Helplessness and inability</li> <li>• Mortality and injury</li> <li>• Loneliness and isolation</li> <li>• Specific emotions</li> <li>• Chaos and delusion</li> <li>• Social support systems</li> <li>• Hopeful messages</li> </ul>                                                                                                                                                                                                                                 |
| Hofhius et al., (2008) [36]<br>The Netherlands. | To evaluate the perceptions of patients regarding nursing care in the ICU, and secondly, to explore patients' perceptions and experiences of their ICU stay. | Female = 4, male = 7.<br>Age = 54–73 years.<br>Ventilation status: 4–20 days.<br>Sedation status: all patients were sedated.                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>• Providing the seriously ill patient with information and explanation</li> <li>• Personal approach by the nurse</li> <li>• Placing the patient in a central position</li> </ul>                                                                                                                                                                                                                                                                                     |
| Karlsson et al., (2011) [25]<br>Sweden          | To illuminate the lived experience of patients who were conscious during mechanical ventilation in an intensive care unit (ICU).                             | Female = 3, male = 9.<br>Age = 23–88 years.<br>LOS = 2–23 days.<br>Ventilation status: All patients were ventilated. Number of days on ventilation not stated.<br>Motor activity assessment scale = 3–4.<br>Cognitive status: not reported.<br>Sedation status: no patient was under sedation during interview. | <ul style="list-style-type: none"> <li>• Being dependent on mechanical ventilation to survive</li> <li>• Being forced to submit to the will of others</li> <li>• Having to submit to other people's willingness to understand non-verbal communication</li> <li>• Being out of control</li> <li>• Having to endure</li> <li>• Experiencing a sense of control</li> <li>• Yearning for independence</li> <li>• Comprehensive understanding</li> <li>• Being viewed as a participant and companion</li> </ul> |
| Locsin and Kongsuwan, (2013) [24]<br>Thailand   | The purpose of this study was to describe the meaning of the experiences of patients who were dependent on technologies while being cared for in ICUs.       | 7 male, 3 female.<br>Age: mean = 43.9 years, range = 22–76 years.<br>LOS: mean = 50.8, range = 2 days–3 months.<br>Ventilation status: patients were ventilated but number of days on ventilation noted reported.                                                                                               | <ul style="list-style-type: none"> <li>• Fear and insecurity of not being one's self</li> <li>• Nightmare</li> <li>• Death is better than suffering</li> <li>• Loss of autonomy</li> <li>• Sustaining life through family support</li> <li>• Not wanting to burden the others</li> <li>• Being in trust and security</li> <li>• Transitioning to a better life</li> <li>• Discovering new meanings of living</li> </ul>                                                                                     |

Table 2. Cont.

| Authors and Country                       | Aim                                                                                                                                                                                                                    | Sample Characteristics                                                                                                                              | Themes                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| McKinley et al., (2002) [26]<br>Australia | To gain an understanding of the experience of being a seriously ill patient in an (ICU).                                                                                                                               | 8 males, 6 females.<br>Aged 17–71.<br>LOS: 3–53 days.<br>Ventilation status: not reported.                                                          | <ul style="list-style-type: none"> <li>• Vulnerability</li> <li>• Security</li> <li>• Salutary experiences</li> <li>• Difficulty communicating and lack of knowledge</li> <li>• Frightening physical experiences</li> <li>• Lack of sleep</li> <li>• Cognitive changes</li> <li>• Pain and discomfort</li> <li>• Personalizing care</li> <li>• Needs anticipated and met</li> </ul> |
| Mortensen et al., (2023) [31]<br>Denmark  | To explore everyday life experiences of critically ill patients with delirium during the ICU stay, from ICU discharge until 1-year follow-up, focusing on their health-related quality of life and cognitive function. | 9 women and 8 men.<br>Age: median = 69 years, range = 57–73.5.<br>LOS: median = 8, IQR = 5.5–26.5.<br>Ventilation status: not reported.             | <ul style="list-style-type: none"> <li>• Struggling to regain a functional life</li> <li>• Struggling to regain normal cognition</li> <li>• Distressing manifestations from the ICU</li> </ul>                                                                                                                                                                                      |
| Mylén et al., (2016) [41]<br>Sweden       | To explore the lived experiences of conscious patients in neurosurgical intensive care.                                                                                                                                | Female = 7, male = 4.<br>Age range = 37–81.<br>LOS = 5–15 days.<br>Cognitive status: GSC 14–15.<br>Ventilation status: no patients were ventilated. | <ul style="list-style-type: none"> <li>• The essence: To feel strong in an unfamiliar situation</li> <li>• To feel safe in an unfamiliar situation</li> <li>• To experience strains and limitations</li> <li>• To be confirmed as a human being</li> </ul>                                                                                                                          |
| Olausson et al., (2013) [37]<br>Sweden    | To reveal the meanings of the ICU settings as a place of care.                                                                                                                                                         | Female = 5, male = 4.<br>Age range = 38–52.<br>LOS = 5–90 days.<br>Ventilation status: not reported.<br>sedation status: not reported.              | <ul style="list-style-type: none"> <li>• A life-affirming place</li> <li>• A place of tenderness and care</li> <li>• A place in-between</li> <li>• A place of trust and security</li> <li>• An embodied place</li> </ul>                                                                                                                                                            |
| Olsen et al., (2017) [35]<br>Norway       | To investigate how adult ICU patients experienced the ICU stay, their recovery period, and the usefulness of the pamphlet.                                                                                             | Female = 10, male = 19.<br>Age range = 20–80.<br>Ventilation status: ventilated for $\geq 48$ .<br>Sedation status: all patients were sedated.      | <ul style="list-style-type: none"> <li>• Floating between facts and delusions</li> <li>• To understand and to be understood</li> <li>• Valuing family</li> </ul>                                                                                                                                                                                                                    |
| Pakmehr et al., (2017) [42]<br>Iran       | To phenomenologically explore the intubated patients' lived experiences of ICU care.                                                                                                                                   | Female = 7, male = 5.<br>Age = 19–48.<br>Ventilation = 2–50 days.<br>Sedation status: not reported.                                                 | <ul style="list-style-type: none"> <li>• Mental health problems associated with the lack of communication</li> <li>• Family as a need for the patients</li> <li>• Intubation as an evocation of imprisonment</li> <li>• Torture and death</li> </ul>                                                                                                                                |

Table 2. Cont.

| Authors and Country                            | Aim                                                                                                                                             | Sample Characteristics                                                                                                                                                                          | Themes                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Roberts et al., (2019) [34]<br>United States   | To determine the pervasive patient experience components and how the experience may have been influenced by targeted, light sedation practices. | Female = 5, male = 10.<br>Average age = 61.8<br>Ventilation status: for less than 14 days.<br>Average LOS = 3.5 days.<br>Sedation status: Richmond agitation Sedation scale score = 1.7.        | <ul style="list-style-type: none"> <li>• Communication difficulties</li> <li>• Feelings of discomfort</li> <li>• Positive interaction with people</li> <li>• Inattentive staff</li> <li>• Unclear recollections</li> </ul>                                                                                                                                                    |
| Rodriguez-Almagro et al., (2019) [27]<br>Spain | To explore the perceptions about the experiences of patients in the ICU, their family members, and the nurses who attend them.                  | Female = 4, male = 5.<br>Age = 22–67.<br>Cognitive status: not reported.<br>ventilation status: not reported.                                                                                   | <ul style="list-style-type: none"> <li>• The experience of humanization and dehumanization</li> <li>• Fear</li> <li>• Feeling of suffering related to noise and pain</li> </ul>                                                                                                                                                                                               |
| Samuelson et al., (2011) [40]<br>Sweden        | To describe unpleasant and pleasant memories of the ICU stay in adult mechanically ventilated patients.                                         | Female = 122, male = 128.<br>Age = $63.4 \pm 13.8$ .<br>Cognitive status: no confusion, delirium.<br>Median LOS = 3.4.<br>Ventilation status: more than 24 h.<br>Sedation status: not reported. | <ul style="list-style-type: none"> <li>• Acute existential distress</li> <li>• Emotional agony</li> <li>• Agitation</li> <li>• Depressive feelings</li> <li>• Loss of control</li> </ul>                                                                                                                                                                                      |
| Sanson et al., (2021) [33]<br>Italy            | To explore the experiences of being cared for in an intensive care unit (ICU) through patients' memories.                                       | Female 42; male 58.<br>Age: 66 (53–77) years.<br>Glasgow Coma Scale: 13 (10–15).<br>Duration of ventilation: 23.5 h (2–67).<br>LOS: 69 h (40–141).                                              | <ul style="list-style-type: none"> <li>• Discomfort</li> <li>• Loss of dignity</li> <li>• Mood fluctuations: feeling anxious, frightened, closeness to death, and worry about relatives</li> <li>• Unheard requests</li> <li>• Delusional memories</li> </ul>                                                                                                                 |
| Schou and Egerod, (2009) [28]<br>Denmark       | To provide a contemporary description of the patient experience of weaning.                                                                     | Female = 2, male = 8.<br>Age range = 35–84.<br>Cognitive status: not reported.<br>Ventilation status: $\geq 24$ h.                                                                              | <ul style="list-style-type: none"> <li>• Discomfort and impaired communication</li> <li>• Loss of control and loneliness</li> <li>• Existential phenomena</li> <li>• Temporality and human interactions</li> </ul>                                                                                                                                                            |
| Takashima et al., (2018) [1]<br>Japan          | To clarify the stress experiences of patients mechanically ventilated in an intensive care unit (ICU) for more than 12 h.                       | 22 women and 74 men.<br>Average age = $69.4 \pm 11.5$ .<br>Average duration of intubation: $54.7 \pm 60.0$ hr.<br>Average LOS: $6.8 \pm 5.9$ days.                                              | <ul style="list-style-type: none"> <li>• Unbearable holistic discomfort.</li> <li>• Pain of being unable to control self.</li> </ul>                                                                                                                                                                                                                                          |
| Tavakoli et al., (2022) [2]<br>Iran            | To study the experiences of discomfort and self-management strategies in patients admitted to the ICU.                                          | 5 females and 8 males.<br>Age range = 17–61 years.<br>LOS: not reported.<br>Ventilation status: not reported.<br>Cognitive status: conscious for at least 72 h after admission to the ICU.      | <ul style="list-style-type: none"> <li>• Fear of disability and possible death</li> <li>• Separation from family</li> <li>• Understanding ambiguity and contradiction in treatment</li> <li>• Environmental disruptors</li> <li>• Painful and unfamiliar devices and treatments</li> <li>• Recourse to spirituality</li> <li>• Benefiting from psychosocial coping</li> </ul> |

Table 2. Cont.

| Authors and Country                     | Aim                                                                                                                                                          | Sample Characteristics                                                                                                                                                                                   | Themes                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vogel et al., (2021) [44]<br>Sweden     | To explore patients' patterns of behaviour during the process from becoming critically ill to recovery at home.                                              | 4 men and 9 women.<br>Age = 22–82 years.<br>LOS = 2–28 days.<br>Ventilation status: not reported.                                                                                                        | <ul style="list-style-type: none"> <li>Recapturing life</li> <li>Recoding life</li> <li>Emotional balancing</li> </ul>                                                                                                                                                                                   |
| Wang et al., (2009) [29]<br>China       | To understand patients' intensive care experience while receiving mechanical ventilation in intensive care units.                                            | Female = 3, male = 8.<br>Age = 33–78 years.<br>Mean LOS = 174.6 h.<br>Cognitive status: not reported.<br>Mean length of mechanical ventilation = 107.3 h.<br>Sedation status: all patients were sedated. | <ul style="list-style-type: none"> <li>Being in an unconventional environment</li> <li>Physical suffering</li> <li>Psychological suffering</li> </ul>                                                                                                                                                    |
| Yahui et al., (2022) [45]<br>China      | To explore the experience of ICU patients and their relatives and to investigate their daily needs within the closed management system in many Chinese ICUs. | 6 male and 9 female.<br>Mean age: $59.60 \pm 17.33$ , range = 28–88 years.<br>Cognitive status: able to communicate verbally.<br>LOS: at least 72 h.<br>Ventilation status: not reported.                | <ul style="list-style-type: none"> <li>Variety of feelings</li> <li>Staff assistance required</li> <li>Expectations for relatives</li> </ul>                                                                                                                                                             |
| Zisopoulos et al., (2022) [3]<br>Greece | To describe how participants describe their ICU experiences and make sense of their experience.                                                              | 17 males, 9 females.<br>Age = 20–68 years.<br>LOS = 2 weeks.<br>Ventilation status: not recorded.<br>Cognitive status: unclear.                                                                          | <ul style="list-style-type: none"> <li>The martyrdom in the ICU: a place where you are buried</li> <li>Difficult moment touched by death</li> <li>Return from the utter void</li> <li>Efforts to regain touch with reality</li> <li>The essential role of family and healthcare professionals</li> </ul> |

Table 3. Quality Appraisal with CASP Tool.

| Included Studies                    | Was There a Clear Statement of the Aims of the Research? | Is a Qualitative Methodology Appropriate? | Was the Research Design Appropriate to Address the Aims of the Research? | Was Recruitment Strategy Appropriate to the Aims? | Were Data Collected in a Way that Addressed the Research Issue? | Has the Relationship Between Researcher and Participants Been Adequately Considered | Have Ethical Issues Been Taken into Consideration? | Were the Data Analysis Sufficiently Rigorous? | Is There a Clear Statement of Findings? | How Valuable Is the Research? | Overall Risk of Bias Assessment |
|-------------------------------------|----------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------|-----------------------------------------|-------------------------------|---------------------------------|
| Albanesi et al. 2020 [12]           | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Ashkenazy et al. 2021 [38]          | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | Yes                                                                                 | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Aslani et al., 2017 [20]            | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| Hofhuis et al., 2008 [36]           | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| Olsen et al., 2017 [35]             | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| Rodriguez-Almagro et al., 2019 [27] | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Alpers et al., 2012 [43]            | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | Yes                                                                                 | Yes                                                | Cannot tell                                   | Yes                                     | Moderately                    | moderate                        |
| Engström et al. 2012 [21]           | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| Samuelson et al. 2011 [40]          | Yes                                                      | Cannot tell                               | Yes                                                                      | No                                                | No                                                              | No                                                                                  | Yes                                                | Cannot tell                                   | Yes                                     | Moderately                    | moderate                        |
| Karlsson et al., 2011 [25]          | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |

Table 3. Cont.

| Included Studies            | Was There a Clear Statement of the Aims of the Research? | Is a Qualitative Methodology Appropriate? | Was the Research Design Appropriate to Address the Aims of the Research? | Was Recruitment Strategy Appropriate to the Aims? | Were Data Collected in a Way that Addressed the Research Issue? | Has the Relationship Between Researcher and Participants Been Adequately Considered | Have Ethical Issues Been Taken into Consideration? | Were the Data Analysis Sufficiently Rigorous? | Is There a Clear Statement of Findings? | How Valuable Is the Research? | Overall Risk of Bias Assessment |
|-----------------------------|----------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------|-----------------------------------------|-------------------------------|---------------------------------|
| Wang et al., 2009 [29]      | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | Yes                                                                                 | Yes                                                | Yes                                           | Yes                                     | Moderately                    | low                             |
| Olausson et al., 2013 [37]  | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| McKinley et al., 2002 [26]  | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Adeyemi, 2016 [19]          | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Pakmehr et al., 2017 [42]   | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| Roberts et al., 2019 [34]   | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Schou and Egerod, 2009 [28] | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | Yes                                                                                 | Yes                                                | Yes                                           | Yes                                     | Moderately                    | low                             |
| Foster, 2009 [22]           | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | Yes                                                                                 | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Mylén et al. 2015 [41]      | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| Vogel et al., 2021 [44]     | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| Tavakoli et al., 2022 [2]   | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |

Table 3. Cont.

| Included Studies                | Was There a Clear Statement of the Aims of the Research? | Is a Qualitative Methodology Appropriate? | Was the Research Design Appropriate to Address the Aims of the Research? | Was Recruitment Strategy Appropriate to the Aims? | Were Data Collected in a Way that Addressed the Research Issue? | Has the Relationship Between Researcher and Participants Been Adequately Considered | Have Ethical Issues Been Taken into Consideration? | Were the Data Analysis Sufficiently Rigorous? | Is There a Clear Statement of Findings? | How Valuable Is the Research? | Overall Risk of Bias Assessment |
|---------------------------------|----------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------|-----------------------------------------|-------------------------------|---------------------------------|
| Zisopoulos et al. 2022 [3]      | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Locsin and Kongsuwan, 2013 [24] | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Herbst and Drenth, 2012 [32]    | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Moderately                    | moderate                        |
| Mortensen et al. 2023 [31]      | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | Yes                                                                                 | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Flahault et al., 2021 [30]      | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | Yes                                                                                 | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Gilder et al., 2022 [23]        | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Sanson et al. 2021 [33]         | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Egylan et al., 2022 [39]        | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |
| Yahui et al., 2022 [45]         | Yes                                                      | Yes                                       | Yes                                                                      | Yes                                               | Yes                                                             | No                                                                                  | Yes                                                | Yes                                           | Yes                                     | Greatly                       | low                             |

Table 4. Themes and sub-themes.

| Participant Quotes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Main Theme                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <p>“...I couldn’t get to sleep once, but that battle Axe [nurse] said I had” [25].</p> <p>“You want to be treated as an adult instead of a child, right?” [36]</p> <p>“Yes, I mean I’m not an engine that needs to be fixed, I mean, I’m a human being” [36]</p> <p>“you know, not giving ...updates ... you just struggle. You feel so helpless, and you wonder if you are going to die” [34]</p> <p>“we were lying on bed like vegetables, it seemed that we did not exist to the nurses, they were chatting and laughing, too noisy” [29]</p> <p>“There were moments when [patients] almost cried in despair. [They were] suffering and [care practitioners] laugh[ed] at the top of their lungs a few meters away” [33]</p> <p>“You... [ring] the bell and no one shows up. [...] It made me feel helpless, and powerless. ... what can I say, you feel hurt and you could easily start to cry.” [36]</p> <p>“someone pressed my arms and legs forcefully, some others opened my mouth and put something into my throat, after that I knew that was the tracheal tube, why did nobody tell me about it before that?” [29]</p> | Disempowerment                                                                 |
| <p>“Weak in [the] body. ....[some] felt like a child, ... who doesn’t think too much, can’t do anything; can’t pee by...self, poo by ...self, can’t do anything” [25]</p> <p>“like a vegetable. ... very defenseless and helpless” [40]</p> <p>“when I woke up from the coma the only thing that I confronted was fear, i.e., if I would be able to speak again because of the tracheotomy and if I would be able to walk again because I was confined in my bed...” [3]</p> <p>“felt strange... like there was a gap between [the] body and mind” [1]</p> <p>“It felt like my upper body was like an elephant, I didn’t expect my legs could carry me” [41]</p> <p>“I didn’t know what they were doing to me... I was a body, there, available” [33]</p>                                                                                                                                                                                                                                                                                                                                                                         | Altered self-identity: altered self perception, self-image and self competency |
| <p>“Being in the ICU is just like a little child who could not swim [and] was thrown into a cold swimming pool [29]</p> <p>“You become very anxious, it is like you are fighting for your life, ... you are just getting instructions push, breath or whatever...” [19]</p> <p>“I am sure that they want to hurt me and nobody explains to me what has happened. The only thing that they cared about is my coughing.” [3]</p> <p>“when a patient becomes ill, the ward falls apart, all the doctors and nurses are gone [leaving other patients] subconsciously restless and upset” [2]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Fighting                                                                       |
| <p>“Like a prisoner with tied hands and feet and closed mouth who is continually punctured with needles and cannot say anything” [42]</p> <p>“you do not see anyone, all in bed [with] a series of devices ...connected to [them that] make noise” [2]</p> <p>“You [can] not move because of the tubes... you are attached to the bed” [38]</p> <p>“Since you are intubated, they passed it through the nose and the nose got sore. When the sore was recovering, they pulled it out and inserted [nasogastric tube] again into the nose. Doing this, they pressed the injured sore which made more pain” [42]</p> <p>“It was one of those things that you have to kind of grin and bear it” [34]</p>                                                                                                                                                                                                                                                                                                                                                                                                                             | Torment                                                                        |
| <p>“to be honest, everyone who wakes up and does not know where he is and once sees all these devices hooked to him and cannot do anything, is definitely going to have another MI [myocardial infarction] from fear” [20]</p> <p>“Today, the doctor comes and says that the operation was very good, you will get up soon and you will not have any special complications. Tomorrow another doctor will come and say that it is too early for me to comment. Maybe you will have a series of complications after the operation!” [2]</p> <p>“There is a lot of can’t... you can’t do ...so all of these accumulate to a bad experience” [19]</p> <p>“From the moment you woke up you wanted to get out, to flee, you don’t want to stay even a minute longer” [3]</p>                                                                                                                                                                                                                                                                                                                                                            | Trauma                                                                         |

Table 4. Cont.

| Participant Quotes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Main Theme          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <p><i>"I was very scared when I realized I was in the ICU. I told myself I was done!" [2]</i></p> <p><i>"when I woke up I found a tube in my throat, [...] I could not stop thinking: Was I dying soon?" [29]</i></p> <p><i>"We were four and I was the only one left. Three died, and I saw them die... It was not easy holding on to the bed waiting for your moment to come" [20,33,37]</i></p> <p><i>"I have no fear of dying, but always of being in pain and suffering... the same pain, I would like to die instead... I thought that if (I) didn't die soon, it would be pitiful [24]</i></p> <p><i>I was in fear. I didn't want to take my eyes off from the monitors... When the machine alarmed, I was frightened. Why did it alarm? What was happening with me?" [24]</i></p> <p><i>"I kept thinking of this: What should I do if there was anything wrong in the machine without someone knowing? Was that my last day of life?" [29]</i></p> <p><i>"I was scared because I thought the night nurse will kill me... so I yelled at her..." [31]</i></p>                                                  | Fear of death       |
| <p><i>"for almost the entire [time], all the lights were on, there was no window, no clock, and [patients] didn't have a sense of time" [3]</i></p> <p><i>"can hear all of it... it's hard to explain but if you can't sleep, can't shut yourself down so to speak, and being afraid of all that may happen makes you scared. Yes all that makes you feel... I can't hang on anymore" [36]</i></p> <p><i>"I did not know what is going on, I woke up, I felt a tube, I thought maybe I will pull a little bit, suddenly I saw the tube halfway out, so I took it out" [38]</i></p> <p><i>"when a patient becomes ill, the ward falls apart, all the doctors and nurses are gone [leaving other patients] subconsciously restless and upset" [2]</i></p> <p><i>"This thing that I put my wrist (referring to manometer connected to an arterial line) makes me both annoyed and afraid to make the slightest moan, because I think it will break and be dangerous for me!" [33]</i></p> <p><i>"an artificial environment, inappropriate to the human being, [and] not compatible with human expectations" [33]</i></p> | Hostile environment |

#### 4. Discussion

This meta-ethnographic review synthesized qualitative evidence on the psychological distress of those hospitalized in the ICU. Understanding critically ill patients' psychological distress can inform the development of measures to assess and manage psychological stressors in the ICU, focusing on patient education, rehabilitation, and evidence-based treatment for ICU-related psychological trauma.

The evidence, drawn from participants' accounts across diverse cultural contexts, highlights the profound psychological distress linked to the critical care experience. As the majority of the identified studies involved predominantly mechanically ventilated male participants, the generalizability of these findings across different ICU populations is uncertain. Female patients in the ICU often experience significant psychological distress, including higher levels of anxiety, depression, and post-traumatic stress, compared to their male counterparts [46], and targeted studies are needed to elucidate the differences in the experience of ICU psychological distress between men and women.

The central finding of this review is that critically ill individuals consistently strive to maintain a sense of agency, even in their most vulnerable moments. Participants described actively fighting for their lives and preserving their bodily and psychological integrity. This reframes the traditional view of healthcare workers fighting solely on behalf of patients [47], instead highlighting the importance of recognizing patients' agency and honoring their wishes. This perspective calls for care that prioritizes inclusivity, empowerment, and active partnership. Participants also emphasized the expectation that nurses should nurture patients' strength, abilities, and determination to fight for their own lives.

The theme of *disempowerment* highlights participants' experiences of reduced autonomy, compromised care quality, and perceived violations of their rights in the ICU. The most frequently cited concern was the lack of timely information about their condition, care plan, and prognosis. While it is essential for care providers to address this, simply delivering information in a clear manner is insufficient to support meaningful self-management. True empowerment requires engaging patients in decision-making, fostering understanding, and respecting their agency throughout the care process [48]. Patients also felt disappointed and disempowered when their request for physical care assistance, such as toileting, were delayed [19,21,26,33,38]. This study confirms that impersonal treatment, feelings of insecurity, and dependence on healthcare staff are significant sources of anxiety for ICU patients [49]. While healthcare teams focus on supporting survival, they may unintentionally undermine patients' mental, physical, and psychological agency when patients feel overly dependent on them [12,24]. The desire for independence [21,25] is often coupled with feelings of being misunderstood [42] and unable to confide in others [42]. Sheridan et al. (2015) suggest that such feelings may stem from low engagement with care providers [48]. Similarly, Christensen and Hewitt (2007) highlight that fostering engaged nurse–patient relationships—such as regularly providing updates and information—can empower ICU patients [50]. Collectively, these studies emphasize the need to move beyond medical paternalism and prioritize patient empowerment by involving them in care decisions and pathways, ultimately fostering greater autonomy in their care.

The theme of *altered self-identity* suggests that critical illness and the process of care threaten patients' identities. This is mostly a result of their loss of functional capacity, vulnerability, loss of dignity, cognitive changes, and influx of negative emotions, including delirium, while in the ICU. In line with this, many patients felt that technology controlled their physical existence, deepening their sense of lost autonomy. A phenomenological study similarly found that dependency on medical technology threatened patients' sense of self, leading to a struggle for independence [51]. Our analysis also revealed that patients feared potential technology failures while relying on these systems. Supporting these findings, a meta-synthesis of 24 qualitative studies highlighted the importance of helping patients regain a sense of control by involving them in treatment decisions throughout their recovery process [52].

The theme of *torment* reflects participants' awareness of the overwhelming control the ICU care system exerts over their bodies and personal wishes. Participants described ICU practices as mentally torturous, eroding their sense of safety and well-being. This theme highlights the restrictive and inflexible spatio-temporal dynamics of the ICU as central to patients' lived experiences. Other studies revealed similar mental health experiences of patients in the ICU [9,53].

The finding that participants used words such as “prison” and “hell” to describe their care experiences in the ICU, aligns with Foucault's (2003) notion on the inter-relationships between medical knowledge and power [54]. In *The Birth of the Clinic*, Foucault (2003) describes that medical knowledge and power are interlinked and are applied to patients in a systematic manner [54]. This practice enables medical practitioners to validate and reproduce medical knowledge through their observations of patients' bodies, and in essence, strengthen the healthcare provider's power exercised on patients through medical knowledge. We extend Foucault's argument to include that spatio-temporal restrictions, the criticality of illness, and practices of the ICU care also introduce another power imbalance between patients and health care providers. When this power is recognized, interrogated, and shared between patients and care providers, patients feel dignified, respected, supported, and empowered to pursue healing. On the other hand, when care providers focus solely on implementing care routines, and healthcare providers' identified health-

care goals for patients, caring may, paradoxically, become oppressive and torturous to patients. Oppression from intubation and extubation represented the largest source of torture among patients [19,29,40,42] and were countered either with psychological resistance (fighting the ventilator) or acquiescence (accepting to submit to the will of the healthcare team) [12,19,25,29,42]. Our study calls on ICU care leaders, practitioners, and stakeholders to identify and implement patient-centered approaches for equalizing power with patients during their ICU care.

The theme of a *hostile environment* arose from participants' perception of the ICU environment as hostile and traumatic. Participants described the ICU sounds and lights as tormenting. Moreover, participants perceived technology as a constant source of anxiety and fear. In line with our data, a recent systematic review revealed medical equipment, such as alarms inducing excess of noise, tubes and cables constraining the patient, bright lights, and sounds of other patients crying out as the highest sources of environmental stressors in the ICU [55]. A study using a sound location system revealed that the majority of loud sounds originated from physiological monitors and ventilators, sited close to patients' ears [56]. Further analysis showed that the frequency range of the patient monitor alarms in the ICU (2.5–3.15 kHz) is similar to a human scream/baby's cry. Although this may be ideal for attracting the attention of staff members, it is far from ideal for patients' rest and comfort. Most of the ICU environmental stressors can be minimized by providing an atmosphere in which rest is possible [57]. For instance, conversations not directly involving patients or their visitors should occur away from the patient bedside. There is promising evidence on a sound reduction bundle comprising staff education, visual warnings of excessive sound levels, and monitor alarm reconfigurations [58]. Studies demonstrate that most alarms require no immediate action, instead precipitating alarm fatigue, leading to an increased risk of missing critical alarms and events [56,59]. Therefore, alarms on physiological monitors, ventilators, and other devices should be adjusted as required by the nursing staff.

Finally, our review also suggests that patients associate the criticality of the condition with impending death. *Fear of death* is a significant psychological stressor for patients in the ICU. This fear can impact not only the patients, but also their families and healthcare providers [60]. Understanding the dynamics of fear and its impact is essential for enhancing patient care and outcomes in the ICU. However, questions persist about the most effective ways to address patients' fear of death [26]. Previous research found this fear to be more common among younger females [34], though our studies did not reveal a similar association. Nonetheless, evidence suggests that women may be more sensitive to emotional stimuli [61]. To better support patients facing this fear, nurses could be trained to deliver gender-tailored psychological interventions [12].

## 5. Practical Implications for Nursing and Healthcare Team

Given the critical nature of the ICU and the intense psychological burdens often experienced by patients, it is essential for nursing and healthcare professionals to adopt strategies that address both physical and emotional needs. The following practical implications are key to improving patient outcomes and fostering a more supportive ICU environment:

### 1. Enhancing Patient-Centered Care

Nurses and healthcare professionals must prioritize patient autonomy and dignity, even in case of patients with impaired consciousness. This can be achieved through shared decision-making with patients and families, ensuring that care aligns with the patient's values and preferences. Clear communications can help to mitigate feelings of powerlessness and perceived violations of autonomy. Moreover, empowering

- patients by involving them in their care/treatment pathways—whenever possible—can support their sense of control and mitigates feelings of helplessness.
2. **Integrating Psychological and Emotional Support into ICU Culture**  
Addressing the psychological distress of ICU patients requires a fundamental shift in ICU culture, where emotional well-being is prioritized alongside implementing care routines for survival. Nurses should implement trauma-informed care strategies, therapeutic communication, and environmental modifications to foster a sense of safety and reduce perceptions of the ICU as a hostile or traumatic space. Routine psychological assessments should be incorporated into patient care, and healthcare teams should receive regular training in patient-centered communication and psychological resilience to ensure that ICU practices minimize distress and promote holistic well-being.
  3. **Integrating Family for Emotional Support**  
Engaging family members as active participants in care can provide patients with a crucial sense of familiarity and reassurance, thereby alleviating psychological distress. For conscious patients, structured family interactions can help maintain emotional connections and enhance their sense of security. For unconscious patients, the presence of family members, along with verbal and non-verbal communication strategies, may contribute to emotional well-being and aid in recovery. Healthcare professionals should facilitate family engagement through flexible visitation policies and psychosocial support programs.

## 6. Limitations

Limiting the included studies to published English articles may introduce selection bias and influence the conclusions of this review. The authors chose English-language studies to ensure consistent interpretation and synthesis across the team. Additionally, the inclusion of studies published over a 21-year span may introduce recency bias when extrapolating lessons from the available evidence. However, it is important to note that significant changes in critical care policies and treatment protocols over the past two decades likely altered patient experiences, underscoring the need to explore patients' perspectives within current care practices.

A potential limitation of the present meta-synthesis may be the fact we did not include patient-specific clinical data, e.g., reasons for ICU admission, length of stay, mental status, pain levels, hospital characteristics, and discharge details. Although such clinical data might provide additional context, they were not reported across the identified studies. Additionally, such analysis falls outside the scope of qualitative meta-synthesis. The focus of the present work was to synthesize patients' lived experiences of psychological distress during ICU hospitalization. Thus, the present meta-ethnography focused on interpreting and integrating qualitative findings rather than extracting or correlating quantitative measures.

Similarly, although exploring how patients' subjective distress correlates with objective clinical indicators may be of high clinical interest, empirical qualitative studies do not typically report quantitative measures. As a result, such correlations cannot be extracted from our dataset. Nevertheless, the present synthesis did not aim to establish causal relationships or predictive factors for psychological distress, but rather to capture the depth and complexity of patients' experiences during ICU hospitalization. Yet, future research employing mixed-methods designs could provide insights into potential associations between patient experiences and clinical variables.

Many studies also showed gender imbalances, often including more male than female participants. Furthermore, most studies did not report racial or ethnic data, limiting the ability to analyze these factors. This highlights the need for future research to explore

ethnic and gender-specific perceptions to better identify and address the psychological needs of ICU patients. Additionally, our synthesis incorporates studies from 19 different countries with varying ICU contexts—encompassing differences in ICU design, nurse-to-patient ratios, and institutional protocols and treatment strategies—and it does not explicitly account for ICU-specific contextual factors. However, existing evidence indicates that regardless of structural and procedural variations, the psychological experiences of ICU patients are globally consistent.

7. Conclusions

ICU admission imposes a significant psychological burden, often leaving a lasting emotional impact. The central theme of this evidence synthesis is the profound sense of disempowerment and loss of control experienced by patients. This pervasive feeling of powerlessness shapes how patients recount their experiences of surviving critical illness and ICU admission. Our review highlights patients’ strong desire for involvement, empathy, and empowerment throughout their care. To address this, future care standards should incorporate stress assessment and management strategies that prioritize patient empowerment and emotional safety during the care process. Additionally, it is imperative for healthcare professionals to prioritize patient autonomy and integrate psychological well-being into ICU care alongside physiological management. Future research should investigate the effects of patient empowerment and trauma-informed care on the short-term and long-term psychological health of ICU patients. Overall, the present findings contribute to understanding patients’ perspectives and emotional experiences.

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**Conflicts of Interest:** The authors declare no conflicts of interest.

Appendix A

Table A1. CINAHL search.

| SN | Search Strategy                                                                                                                                        | Results |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| S1 | (MH “Intensive Care Units”) OR (MH “Coronary Care Units”) OR (MH “Post Anesthesia Care Units”) OR (MH “Respiratory Care Units”) OR (MH “Stroke Units”) | 44,040  |
| S2 | (MH “Critical Care”)                                                                                                                                   | 23,517  |
| S3 | (MH “Critical Illness”) OR (MH “Critically Ill Patients”)                                                                                              | 25,309  |

Table A1. Cont.

| SN  | Search Strategy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Results |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| S4  | ("intensive care" or "critical care" or "critical* ill*" or "medical crisis" or ICU or ICUs or CCU or CCUs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 155,015 |
| S5  | (MH "Respiration, Artificial + ")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 34,536  |
| S6  | ((mechanic* or artificial* or assisted) N2 (ventilat* or respirat* or breath*))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 42,132  |
| S7  | S1 OR S2 OR S3 OR S4 OR S5 OR S6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 191,298 |
| S8  | (MH "Stress, Psychological") OR (MH "Reality Shock")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 51,666  |
| S9  | (MH "Psychological Distress")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 859     |
| S10 | (MH "Anxiety")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 45,277  |
| S11 | (MH "Fear") OR (MH "Suffering") OR (MH "Worry") OR (MH "Hopelessness")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 17,461  |
| S12 | ((emotion* or psychologic* or mental*) N2 (stress* or pressure* or tension* or distress* or strain* or pain* or suffer* or trauma*))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 163,910 |
| S13 | (anxiet* or anxious* or fear* or worry or worries or worrisome or panic*)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 145,937 |
| S14 | (MH "Stress Disorders, Post-Traumatic")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 23,172  |
| S15 | (MH "Psychological Trauma")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1483    |
| S16 | ("stress disorder*" or PTSD)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 28,535  |
| S17 | S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 289,779 |
| S18 | qualitative OR ethnoc* OR ethnog* OR ethnonurs* OR emic OR etic OR leininger OR nobilit OR "field note*" OR "field record*" OR fieldnote* OR "field stud*" or "participant observ*" OR "participant observation*" OR hermeneutic* OR phenomenolog* OR "lived experience*" OR heidegger* OR husserl* OR "merleau-pont*" OR colaizzi OR giorgi OR ricoeur OR spiegelberg OR "van kaam" OR "van manen" OR "grounded theory" OR "constant compar*" OR "theoretical sampl*" OR glaser AND strauss OR "content analy*" OR "thematic analy*" OR narrative* OR "unstructured categor*" OR "structured categor*" OR "unstructured interview*" OR "semi-structured interview*" OR "maximum variation*" OR snowball OR audio* OR tape* OR video* OR metasynthes* OR "meta-synthes*" OR metasummar* OR "meta-summar*" OR metastud* OR "meta-stud*" OR "meta-ethnograph*" OR metaethnog* OR "meta-narrative*" OR metanarrat* OR "meta-interpretation*" OR metainterpret* OR "qualitative meta-analy*" OR "qualitative metaanaly*" OR "qualitative metanaly*" OR "purposive sampl*" OR "action research" OR "focus group*" or photovoice or "photo voice" or "mixed method" | 477,497 |
| S19 | S7 AND S17 AND S18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1839    |
| S20 | TI (PICU or NICU or "p?ediatric intensive care" or "neonatal intensive care")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 7060    |
| S21 | S19 NOT S20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1666    |

Table A2. Medline via OVID.

| SN | Search Strategy                                                                                                 | Results |
|----|-----------------------------------------------------------------------------------------------------------------|---------|
| 1. | exp intensive care units/                                                                                       | 87,213  |
| 2. | Critical care/                                                                                                  | 53,383  |
| 3. | Critical illness/                                                                                               | 264,863 |
| 4. | ("intensive care" or "critical care" or "critical* ill*" or "medical crisis" or ICU or ICUs or CCU or CCUs).mp. | 49,929  |
| 5. | Respiration, artificial/                                                                                        | 49,929  |

Table A2. Cont.

| SN  | Search Strategy                                                                                                                                                                                                                                                                                                                                                    | Results |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 6.  | ((mechanic* or artificial* or assisted) adj2 (ventilat* or respirat* or breath*)).mp.                                                                                                                                                                                                                                                                              | 110,073 |
| 7.  | or/1–6                                                                                                                                                                                                                                                                                                                                                             | 346,966 |
| 8.  | Stress, psychological/                                                                                                                                                                                                                                                                                                                                             | 122,600 |
| 9.  | Psychological Distress/                                                                                                                                                                                                                                                                                                                                            | 1126    |
| 10. | Anxiety/                                                                                                                                                                                                                                                                                                                                                           | 83,550  |
| 11. | exp Fear/                                                                                                                                                                                                                                                                                                                                                          | 33,719  |
| 12. | ((emotion* or psychologic* or mental*) adj2 (stress* or pressure* or tension* or distress* or strain* or pain* or suffer* or trauma*)).mp.                                                                                                                                                                                                                         | 165,424 |
| 13. | (anxiet* or anxious* or fear* or worry or worries or worrisome or panic*).mp.                                                                                                                                                                                                                                                                                      | 348,181 |
| 14. | stress disorders, traumatic/ or psychological trauma/ or stress disorders, post-traumatic/ or stress disorders, traumatic, acute/                                                                                                                                                                                                                                  | 35,336  |
| 15. | ("stress disorder*" or PTSD).mp.                                                                                                                                                                                                                                                                                                                                   | 51,114  |
| 16. | or/8–15                                                                                                                                                                                                                                                                                                                                                            | 511,111 |
| 17. | 7 and 16                                                                                                                                                                                                                                                                                                                                                           | 7725    |
| 18. | exp qualitative research/ or grounded theory/                                                                                                                                                                                                                                                                                                                      | 59,926  |
| 19. | exp Nursing Methodology Research/                                                                                                                                                                                                                                                                                                                                  | 16,381  |
| 20. | anthropology, cultural/                                                                                                                                                                                                                                                                                                                                            | 6566    |
| 21. | exp focus groups/                                                                                                                                                                                                                                                                                                                                                  | 30,959  |
| 22. | qualitative.mp.                                                                                                                                                                                                                                                                                                                                                    | 259,782 |
| 23. | (ethnol\$ or ethnog\$ or ethnnonurs\$ or emic or etic).mp.                                                                                                                                                                                                                                                                                                         | 177,175 |
| 24. | (leiningers\$ or noblit).mp. or hare.ti,ab.                                                                                                                                                                                                                                                                                                                        | 2632    |
| 25. | (field note\$ or field record\$ or fieldnote\$ or field stud\$).mp.                                                                                                                                                                                                                                                                                                | 18,878  |
| 26. | (participant\$ adj3 observ\$).mp.                                                                                                                                                                                                                                                                                                                                  | 11,699  |
| 27. | (nonparticipant\$ adj3 observ\$).mp.                                                                                                                                                                                                                                                                                                                               | 161     |
| 28. | (non participant\$ adj3 observ\$).mp.                                                                                                                                                                                                                                                                                                                              | 676     |
| 29. | (hermeneutic\$ or phenomenolog\$ or lived experience\$).mp.                                                                                                                                                                                                                                                                                                        | 33,448  |
| 30. | (heidegger\$ or husserl\$ or merleau-pont\$).mp.                                                                                                                                                                                                                                                                                                                   | 1112    |
| 31. | (colaizzi\$ or giorgi\$).mp.                                                                                                                                                                                                                                                                                                                                       | 1495    |
| 32. | (ricoeur or spiegelberg\$).mp.                                                                                                                                                                                                                                                                                                                                     | 316     |
| 33. | (van kaam\$ or van manen).mp.                                                                                                                                                                                                                                                                                                                                      | 204     |
| 34. | (Grounded adj5 theor\$).mp.                                                                                                                                                                                                                                                                                                                                        | 13,927  |
| 35. | (constant compar\$ or theoretical sampl\$ or triangulat\$).ti,ab.                                                                                                                                                                                                                                                                                                  | 12,219  |
| 36. | (glaser and strauss).mp.                                                                                                                                                                                                                                                                                                                                           | 110     |
| 37. | ((content or theme* or thematic or narrative or discourse) adj2 analys*).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] | 61,760  |
| 38. | (unstructured categor\$ or structured categor\$).mp.21                                                                                                                                                                                                                                                                                                             |         |
| 39. | (unstructured interview\$ or semi-structured interview\$ or semistructured interview\$).mp.                                                                                                                                                                                                                                                                        | 45,122  |
| 40. | (maximum variation or snowball).mp.                                                                                                                                                                                                                                                                                                                                | 3845    |

Table A2. Cont.

| SN  | Search Strategy                                                                                                                                                                                                                   | Results   |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 41. | (audiorecord\$ or taperecord\$ or videorecord\$ or videotap\$).mp.                                                                                                                                                                | 21,203    |
| 42. | ((audio or tape or video\$) adj5 record\$).mp.                                                                                                                                                                                    | 62,580    |
| 43. | ((audio\$ or video\$ or tape\$) adj5 interview\$).mp.                                                                                                                                                                             | 9764      |
| 44. | (metasynthes\$ or meta-synthes\$ or metasummar\$ or meta-summar\$ or metastud\$ or meta-stud\$).ti,ab.                                                                                                                            | 1548      |
| 45. | (meta-ethnog\$ or metaethnog\$ or meta-narrat\$ or metanarrat\$ or meta-interpret\$ or metainterpret\$).mp.                                                                                                                       | 837       |
| 46. | (qualitative adj5 meta-analy\$).mp.                                                                                                                                                                                               | 640       |
| 47. | (qualitative adj5 metaanaly\$).mp.                                                                                                                                                                                                | 3         |
| 48. | purposive sampl\$.mp.                                                                                                                                                                                                             | 8287      |
| 49. | action research.mp.                                                                                                                                                                                                               | 4423      |
| 50. | focus group\$.mp.                                                                                                                                                                                                                 | 54,612    |
| 51. | exp interview / or exp interviews as topic / or narration /                                                                                                                                                                       | 101,155   |
| 52. | ((audio* or video* or tape* or record*) and (interview* or transcri* or theme* or thematic)).mp.                                                                                                                                  | 70,943    |
| 53. | experience*.ti. and (audio* or video* or tape* or record*).mp. and px.fs.                                                                                                                                                         | 3174      |
| 54. | ((interview* or audio* or video* or record*) and (views or perception* or belief* or attitude* or perspective*)).mp.                                                                                                              | 206,632   |
| 55. | (photo voice or photovoice or mixed method*).mp.                                                                                                                                                                                  | 25,221    |
| 56. | or/18–55                                                                                                                                                                                                                          | 827,158   |
| 57. | (mixed method* or multi-method* or multiple research method* or multiple method* or multimethod* or mixed model* or mixed research).tw.                                                                                           | 54,994    |
| 58. | ((qualitative or qual) and (quantitative or quan) and (nested or blend* or concurrent or complementary or expansion or initiation or holistic or transformative or embedded or iterative or triangulat*)).tw.                     | 5795      |
| 59. | ((quantitative or quan) and (phenomenolog* or ethno* or (grounded adj3 theor*) or hermeneutic* or lived experience* or content analys* or thematic or theme* or narrative* or interview* or focus group* or action research)).tw. | 23,943    |
| 60. | (triangulat* adj15 (method* or data or concurrent or sequential or simultaneous or design*)).tw.                                                                                                                                  | 3586      |
| 61. | (qualitative adj5 quantitative adj5 (combin* or mixed or mix or integrat* or method* or analys*)).tw.                                                                                                                             | 19,248    |
| 62. | exp qualitative research / and quantitative.tw.                                                                                                                                                                                   | 4485      |
| 63. | or/57–62                                                                                                                                                                                                                          | 91,705    |
| 64. | (qualitative and quantitative).tw.                                                                                                                                                                                                | 80,055    |
| 65. | exp Nursing Research / or exp Health Services Research / or exp Rehabilitation /                                                                                                                                                  | 517,202   |
| 66. | (px or nu or rh or ed or og or es or eh).fs.                                                                                                                                                                                      | 2,108,305 |
| 67. | (nurs* or educat* or rehabilitat* or psych* or social or socio* or service* or interview* or questionnaire* or survey*).af.                                                                                                       | 6,681,233 |
| 68. | or/65–67                                                                                                                                                                                                                          | 6,994,217 |
| 69. | 64 and 68                                                                                                                                                                                                                         | 33,921    |
| 70. | 63 or 69                                                                                                                                                                                                                          | 102,783   |

Table A2. *Cont.*

| SN  | Search Strategy                                                                | Results   |
|-----|--------------------------------------------------------------------------------|-----------|
| 71. | (clinical trial* or evaluation studies or randomized controlled trial).pt.     | 858,986   |
| 72. | (randomized or (clinical adj3 trial*) or (controlled adj3 trial*)).mp.         | 1,570,183 |
| 73. | 71 or 72                                                                       | 1,570,208 |
| 74. | qualitative.mp.                                                                | 259,782   |
| 75. | 73 and 74                                                                      | 16,078    |
| 76. | ((qualitative or quantitative) adj5 nested).tw.                                | 750       |
| 77. | 70 or 75 or 76                                                                 | 114,804   |
| 78. | 56 or 77                                                                       | 858,542   |
| 79. | 17 and 78                                                                      | 1330      |
| 80. | (PICU or NICU or “p?ediatric intensive care” or “neonatal intensive care”).ti. | 10,908    |
| 81. | 79 not 80                                                                      | 1154      |

**Table A3.** Dissertations and Theses Global via ProQuest.

| SN | Search Strategy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Results |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| S1 | noft(("intensive care" or "critical care" or "critical* ill*" or "medical crisis" or ICU or ICUs or CCU or CCUs)) OR noft(((mechanic* or artificial* or assisted) NEAR/2 (ventilat* or respirat* or breath*)))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 7697    |
| S2 | noft(((emotion* OR psychologic* OR mental*) NEAR/2 (stress* OR pressure* OR tension* OR distress* OR strain* OR pain* OR suffer* OR trauma*))) OR noft((anxiet* OR anxious* OR fear* OR worry OR worries OR worrisome OR panic*)) OR noft(("stress disorder*" OR PTSD))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 102,675 |
| S3 | noft(qualitative OR ethnoc* OR ethnog* OR ethnonurs* OR emic OR etic OR leininger OR noblit OR "field note*" OR "field record*" OR fieldnote* OR "field stud*" OR "participant observ*" OR "participant observation*" OR hermaneutic* OR phenomenolog* OR "lived experience*" OR heidegger* OR husserl* OR "merleau-pont*" OR colaizzi OR giorgi OR ricoeur OR spiegelberg OR "van kaam" OR "van manen" OR "grounded theory" OR "constant compar*" OR "theoretical sampl*" OR glaser AND strauss OR "content analy*" OR "thematic analy*" OR narrative* OR "unstructured categor*" OR "structured categor*" OR "unstructured interview*" OR "semi-structured interview*" OR "maximum variation*" OR snowball OR audio* OR tape* OR video* OR metasyntes* OR "meta-syntes*" OR metasummar* OR "meta-summar*" OR metastud* OR "meta-stud*" OR "meta-ethnograph*" OR metaethnog* OR "meta-narrative*" OR metanarrat* OR " meta-interpretation*" OR metainterpret* OR "qualitative meta-analy*" OR "qualitative metaanaly*" OR "qualitative metanaly*" OR "purposive sampl*" OR "action research" OR "focus group*" OR photovoice OR "photo voice" OR "mixed method*") | 499,472 |
| S4 | S1 and S2 and S3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 156     |
| S5 | ti((PICU OR NICU OR "p?ediatric intensive care" OR "neonatal intensive care")) OR ti(child* or infant* or neonate* or adolescen*)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 143,497 |
| S6 | S4 and S5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 102     |

Table A4. Scopus via Elsevier.

| SN | Search Strategy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Results |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|    | (((TITLE-ABS-KEY ("intensive care" OR "critical care" OR "critical* ill*" OR "medical crisis" OR icu OR icus OR ccu OR ccus)) OR (TITLE-ABS-KEY ((mechanic* OR artificial* OR assisted) W/2 (ventilat* OR respirat* OR breath*)))) AND ((TITLE-ABS-KEY ((emotion* OR psychologic* OR mental*) W/2 (stress* OR pressure* OR tension* OR distress* OR strain* OR pain* OR suffer* OR trauma*))) OR (TITLE-ABS-KEY (anxiet* OR anxious* OR fear* OR worry OR worries OR worrisome OR panic*)) OR (TITLE-ABS-KEY ("stress disorder*" OR ptsd))) AND (TITLE-ABS-KEY (qualitative OR ethno* OR ethnog* OR ethnonurs* OR emic OR etic OR leininger OR noblit OR "field note*" OR "field record*" OR fieldnote* OR "field stud*" OR "participant observ*" OR "participant observation*" OR hermeneutic* OR phenomenolog* OR "lived experience*" OR heidegger* OR husserl* OR "merleau-pont*" OR colaizzi OR giorgi OR ricoeur OR spiegelberg OR "van kaam" OR "van manen" OR "grounded theory" OR "constant compar*" OR "theoretical sampl*" OR glaser AND strauss OR "content analy*" OR "thematic analy*" OR narrative* OR "unstructured categor*" OR "structured categor*" OR "unstructured interview*" OR "semi-structured interview*" OR "maximum variation*" OR snowball OR audio* OR tape* OR video* OR metasynthes* OR "meta-synthes*" OR metasummar* OR "meta-summar*" OR metastud* OR "meta-stud*" OR "meta-ethnograph*" OR metaethnog* OR "meta-narrative*" OR metanarrat* OR "meta-interpretation*" OR metainterpret* OR "qualitative meta-analy*" OR "qualitative metaanaly*" OR "qualitative metanaly*" OR "purposive sampl*" OR "action research" OR "focus group*" OR photovoice OR "photo voice" OR "mixed method*")) AND NOT (TITLE (picu OR nicu OR "p?ediatric intensive care" OR "neonatal intensive care")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) | 461     |

Table A5. EMBASE via OVID.

| SN  | Search Strategy                                                                                                                                                                                                     | Results |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 1.  | intensive care unit/ or burn unit/ or coronary care unit/ or medical intensive care unit/ or neurological intensive care unit/ or psychiatric intensive care unit/ or stroke unit/ or surgical intensive care unit/ | 185,005 |
| 2.  | intensive care/ or exp artificial feeding/ or exp artificial ventilation/ or exp intensive care nursing/ or exp patient monitoring/ or exp resuscitation/                                                           | 700,851 |
| 3.  | critical illness/                                                                                                                                                                                                   | 30,491  |
| 4.  | ("intensive care" or "critical care" or "critical* ill*" or "medical crisis" or ICU or ICUs or CCU or CCUs).mp.                                                                                                     | 461,516 |
| 5.  | ((mechanic* or artificial* or assisted) adj2 (ventilat* or respirat* or breath*)).mp.                                                                                                                               | 194,598 |
| 6.  | or/1–5                                                                                                                                                                                                              | 993,957 |
| 7.  | mental stress/                                                                                                                                                                                                      | 84,638  |
| 8.  | distress syndrome/                                                                                                                                                                                                  | 46,611  |
| 9.  | fear/ or anxiety/                                                                                                                                                                                                   | 266,725 |
| 10. | ((emotion* or psychologic* or mental*) adj2 (stress* or pressure* or tension* or distress* or strain* or pain* or suffer* or trauma*)).mp.                                                                          | 157,928 |
| 11. | (anxiet* or anxious* or fear* or worry or worries or worrisome or panic*).mp.                                                                                                                                       | 519,120 |
| 12. | exp anxiety disorder/                                                                                                                                                                                               | 251,161 |
| 13. | psychotrauma/                                                                                                                                                                                                       | 9117    |
| 14. | ("stress disorder*" or PTSD).mp.                                                                                                                                                                                    | 70,861  |
| 15. | or/7–14                                                                                                                                                                                                             | 733,756 |

Table A5. Cont.

| SN  | Search Strategy                                                                                                                                                                                                                                                                   | Results   |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 16. | 6 and 15                                                                                                                                                                                                                                                                          | 23,866    |
| 17. | (mixed method* or multi-method* or multiple method* or multiple research method* or multimethod* or mixed model* or mixed research).tw.                                                                                                                                           | 72,100    |
| 18. | ((qualitative or qual) and (quantitative or quan) and (nested or concurrent or complementary or expansion or initiation or holistic or transformative or embedded or iterative or triangulat*)).tw.                                                                               | 7464      |
| 19. | ((quantitative or quan) and (phenomenolog* or ethno* or (grounded adj3 theor*) or hermeneutic* or lived experience* or content analys* or thematic or theme* or narrative* or interview* or focus group* or action research)).tw.                                                 | 30,882    |
| 20. | (triangulat* adj15 (method* or data or concurrent or sequential or simultaneous or design*)).tw.                                                                                                                                                                                  | 4433      |
| 21. | (qualitative adj5 quantitative adj5 (combin* or blend* or mixed or mix or integrat* or method* or analys*)).tw.                                                                                                                                                                   | 24,598    |
| 22. | exp qualitative research/ and quantitative.tw.                                                                                                                                                                                                                                    | 7318      |
| 23. | or/17–22                                                                                                                                                                                                                                                                          | 120,842   |
| 24. | (qualitative and quantitative).tw.                                                                                                                                                                                                                                                | 103,492   |
| 25. | (nurs* or educat* or rehabilitat* or psych* or social or socio* or service* or interview* or questionnaire* or survey*).af.                                                                                                                                                       | 8,661,137 |
| 26. | 24 and 25                                                                                                                                                                                                                                                                         | 449,94    |
| 27. | 23 or 26                                                                                                                                                                                                                                                                          | 136,347   |
| 28. | (qualitative and (randomized or (clinical adj3 trial*) or (controlled adj3 trial*))).mp. [mp = title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word] | 25,586    |
| 29. | ((qualitative or quantitative) adj5 nested).tw.                                                                                                                                                                                                                                   | 969       |
| 30. | 27 or 28 or 29                                                                                                                                                                                                                                                                    | 156,067   |
| 31. | qualitative.mp.                                                                                                                                                                                                                                                                   | 341,811   |
| 32. | (ethnol\$ or ethnog\$ or ethnonurs\$ or emic or etic).mp.                                                                                                                                                                                                                         | 87,812    |
| 33. | (leiningers\$ or nobilit or hare).ti,ab.                                                                                                                                                                                                                                          | 2805      |
| 34. | (field note\$ or field record\$ or fieldnote\$ or field stud\$).mp.                                                                                                                                                                                                               | 25,400    |
| 35. | (participant\$ adj3 observ\$).mp.                                                                                                                                                                                                                                                 | 20,105    |
| 36. | (nonparticipant\$ adj3 observ\$).mp.                                                                                                                                                                                                                                              | 172       |
| 37. | (non participant\$ adj3 observ\$).mp.                                                                                                                                                                                                                                             | 870       |
| 38. | (hermeneutic\$ or phenomenolog\$ or lived experience\$).mp.                                                                                                                                                                                                                       | 41,604    |
| 39. | (heidegger\$ or husserl\$ or merleau-pont\$).mp.                                                                                                                                                                                                                                  | 1301      |
| 40. | (colaizzi\$ or giorgi\$).mp.                                                                                                                                                                                                                                                      | 1833      |
| 41. | (ricoeur or spiegelberg\$).mp.                                                                                                                                                                                                                                                    | 437       |
| 42. | (van kaam\$ or van manen).mp.                                                                                                                                                                                                                                                     | 260       |
| 43. | (Grounded adj5 theor\$).mp.                                                                                                                                                                                                                                                       | 17,396    |
| 44. | (constant compar\$ or theoretical sampl\$ or triangulat\$).ti,ab.                                                                                                                                                                                                                 | 15,320    |
| 45. | (glaser and strauss).mp.                                                                                                                                                                                                                                                          | 143       |
| 46. | (content analys\$ or thematic analys\$ or narrative analys\$).mp.                                                                                                                                                                                                                 | 69,915    |
| 47. | (unstructured categor\$ or structured categor\$).mp.                                                                                                                                                                                                                              | 28        |
| 48. | (unstructured interview\$ or semi-structured interview\$ or semistructured interview\$).mp.                                                                                                                                                                                       | 67,154    |

Table A5. Cont.

| SN  | Search Strategy                                                                                             | Results |
|-----|-------------------------------------------------------------------------------------------------------------|---------|
| 49. | (maximum variation or snowball).mp.                                                                         | 4952    |
| 50. | (audiorecord\$ or taperecord\$ or videorecord\$ or videotap\$).mp.                                          | 104,605 |
| 51. | ((audio or tape or video\$) adj5 record\$).mp.                                                              | 39,686  |
| 52. | ((audio\$ or video\$ or tape\$) adj5 interview\$).mp.                                                       | 13,842  |
| 53. | (metasynthes\$ or meta-synthes\$ or metasummar\$ or meta-summar\$ or metastud\$ or meta-stud\$).ti,ab.      | 1726    |
| 54. | (meta-ethnog\$ or metaethnog\$ or meta-narrat\$ or metanarrat\$ or meta-interpret\$ or metainterpret\$).mp. | 948     |
| 55. | (qualitative adj5 meta-analy\$).mp.                                                                         | 911     |
| 56. | (qualitative adj5 metaanaly\$).mp.                                                                          | 18      |
| 57. | purposive sampl\$.mp.                                                                                       | 11,861  |
| 58. | action research.mp.                                                                                         | 5655    |
| 59. | focus group\$.mp.                                                                                           | 62,086  |
| 60. | (photo voice or photovoice).mp.                                                                             | 925     |
| 61. | 61 or/31–60                                                                                                 | 701,223 |
| 62. | 30 or 61                                                                                                    | 754,998 |
| 63. | 16 and 62                                                                                                   | 2261    |
| 64. | (PICU or NICU or “p?ediatric intensive care” or “neonatal intensive care”).ti.                              | 15,669  |
| 65. | 63 not 64                                                                                                   | 2086    |

Table A6. PsycINFO via OVID.

| SN  | Search Strategy                                                                                                                            | Results |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 1.  | intensive care/                                                                                                                            | 4386    |
| 2.  | artificial respiration/                                                                                                                    | 245     |
| 3.  | (“intensive care” or “critical care” or “critical* ill*” or “medical crisis” or ICU or ICUs or CCU or CCUs).mp.                            | 12,604  |
| 4.  | ((mechanic* or artificial* or assisted) adj2 (ventilat* or respirat* or breath*)).mp.                                                      | 1656    |
| 5.  | or/1–4                                                                                                                                     | 13,580  |
| 6.  | psychological stress/                                                                                                                      | 8990    |
| 7.  | distress/                                                                                                                                  | 23,101  |
| 8.  | anxiety/                                                                                                                                   | 63,637  |
| 9.  | fear/ or panic/                                                                                                                            | 20,310  |
| 10. | ((emotion* or psychologic* or mental*) adj2 (stress* or pressure* or tension* or distress* or strain* or pain* or suffer* or trauma*)).mp. | 85,994  |
| 11. | (anxiet* or anxious* or fear* or worry or worries or worrisome or panic*).mp.                                                              | 330,909 |
| 12. | exp posttraumatic stress disorder/ or acute stress disorder/ or emotional trauma/ or posttraumatic stress/                                 | 45,871  |
| 13. | (“stress disorder*” or PTSD).mp.                                                                                                           | 53,876  |
| 14. | or/6–13                                                                                                                                    | 430,776 |
| 15. | 5 and 14                                                                                                                                   | 1715    |

Table A6. Cont.

| SN  | Search Strategy                                                                                                                                                                                                            | Results |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 16. | qualitative study.md.                                                                                                                                                                                                      | 241,389 |
| 17. | exp qualitative research/ or grounded theory/                                                                                                                                                                              | 16,173  |
| 18. | phenomenology/ or constructivism/ or hermeneutics/                                                                                                                                                                         | 21,484  |
| 19. | ETHNOGRAPHY/                                                                                                                                                                                                               | 9050    |
| 20. | exp Content Analysis/                                                                                                                                                                                                      | 17,649  |
| 21. | qualitative.mp.                                                                                                                                                                                                            | 175,473 |
| 22. | (ethno\$ or emic or etic).mp.                                                                                                                                                                                              | 41,675  |
| 23. | (leininger\$ or noblit or hare).ti,ab.                                                                                                                                                                                     | 1348    |
| 24. | leininger m\$.cu.                                                                                                                                                                                                          | 8       |
| 25. | noblit g\$.cu.                                                                                                                                                                                                             | 0       |
| 26. | hare r\$.cu.                                                                                                                                                                                                               | 3       |
| 27. | (field note\$ or field record\$ or fieldnote\$ or field stud\$).mp.                                                                                                                                                        | 13,210  |
| 28. | (participant\$ adj3 observ\$).mp.                                                                                                                                                                                          | 14,119  |
| 29. | (nonparticipant\$ adj3 observ\$).mp.                                                                                                                                                                                       | 205     |
| 30. | (non participant\$ adj3 observ\$).mp.                                                                                                                                                                                      | 413     |
| 31. | (hermeneutic\$ or phenomenolog\$ or lived experience\$).mp.                                                                                                                                                                | 59,318  |
| 32. | (heidegger\$ or husserl\$ or merleau-pont\$).mp,cu.                                                                                                                                                                        | 15,996  |
| 33. | (colaizzi\$ or giorgi\$).mp,cu.                                                                                                                                                                                            | 7205    |
| 34. | (ricoeur or spiegelberg\$).mp,cu.                                                                                                                                                                                          | 6216    |
| 35. | (van kaam\$ or van manen).mp,cu.                                                                                                                                                                                           | 4451    |
| 36. | (Grounded adj5 theor\$).mp.                                                                                                                                                                                                | 21,263  |
| 37. | (constant compar\$ or theoretical sampl\$ or triangulat\$).ti,ab.                                                                                                                                                          | 12,128  |
| 38. | (glaser or strauss).mp.                                                                                                                                                                                                    | 3194    |
| 39. | glaser b\$.cu.                                                                                                                                                                                                             | 5       |
| 40. | strauss a\$.cu.                                                                                                                                                                                                            | 9       |
| 41. | ((content or theme* or thematic or narrative or discourse) adj2 analys*).mp. [mp = title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]                                 | 63,902  |
| 42. | (unstructured categor\$ or structured categor\$).mp.                                                                                                                                                                       | 29      |
| 43. | (unstructured interview\$ or semi-structured interview\$ or semistructured interview\$).mp.                                                                                                                                | 46,410  |
| 44. | (maximum variation or snowball).mp.                                                                                                                                                                                        | 2703    |
| 45. | (audiorecord\$ or taperecord\$ or videorecord\$ or videotap\$).mp.                                                                                                                                                         | 23,803  |
| 46. | ((audio or video*) adj5 (recorded or recording or tape* or taping)) or (tape adj3 record*).mp.                                                                                                                             | 15,183  |
| 47. | ((audio* or video* or tape* or taping or recording) and (interview* or transcri* or theme* or thematic)).mp. [mp = title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh] | 26,649  |
| 48. | (metasynthes\$ or meta-synthes\$ or metasummar\$ or meta-summar\$ or metastud\$ or meta-stud\$).ti,ab.                                                                                                                     | 971     |
| 49. | (meta-ethnog\$ or metaethnog\$ or meta-narrat\$ or metanarrat\$ or meta-interpret\$ or metainterpret\$).mp.                                                                                                                | 757     |
| 50. | (qualitative adj5 meta-analy\$).mp.                                                                                                                                                                                        | 285     |

Table A6. Cont.

| SN  | Search Strategy                                                                                                                                                                                      | Results |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 51. | (qualitative adj5 metaanaly\$).mp.                                                                                                                                                                   | 3       |
| 52. | purposive sampl\$.mp.5304                                                                                                                                                                            |         |
| 53. | action research.mp.9589                                                                                                                                                                              |         |
| 54. | focus group\$.mp.                                                                                                                                                                                    | 39,087  |
| 55. | (photo voice or photovoice or mixed method*).mp.                                                                                                                                                     | 26,884  |
| 56. | or/16–55                                                                                                                                                                                             | 513,897 |
| 57. | (mixed method* or multi-method* or multiple method* or multimethod* or mixed model* or mixed research).tw.                                                                                           | 40,823  |
| 58. | (triangulat* adj15 (method* or data or concurrent or sequential or simultaneous or design*)).tw.                                                                                                     | 4688    |
| 59. | (quantitative or quan).tw,md.                                                                                                                                                                        | 103,896 |
| 60. | (phenomenolog* or ethno* or (grounded adj3 theor*) or hermeneutic* or lived experience* or content analys* or thematic or theme* or narrative* or interview* or focus group* or action research).mp. | 644,155 |
| 61. | 60 and 59                                                                                                                                                                                            | 27,527  |
| 62. | (qualitative.mp. or qualitative study.md.) and (quantitative.mp. or quantitative study.md.)                                                                                                          | 101,561 |
| 63. | ((qualitative or quantitative) adj5 nested).tw.                                                                                                                                                      | 132     |
| 64. | (qualitative and (randomized or (clinical adj5 trial*) or (controlled adj5 trial*))).tw.                                                                                                             | 3139    |
| 65. | or/57–58,61–64                                                                                                                                                                                       | 131,796 |
| 66. | 56 or 65                                                                                                                                                                                             | 528,987 |
| 67. | 15 and 66                                                                                                                                                                                            | 348     |
| 68. | (PICU or NICU or “p?ediatric intensive care” or “neonatal intensive care”).ti.                                                                                                                       | 1159    |
| 69. | 67 not 68                                                                                                                                                                                            | 301     |

Table A7. Interpretation of the identified themes of the psychological responses of ICU patients.

| Patient Quotes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | First-Order Interpretation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Second-Order Interpretation                          | Third-Order Interpretation |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------|
| <p>“Like a prisoner with tied hands and feet and closed mouth who is continually punctured with needles and cannot say anything” [42]</p> <p>“you do not see anyone, all in bed [with] a series of devices . . .connected to [them that] make noise” [2]</p> <p>“You [can] not move because of the tubes... you are attached to the bed” [38] “Since you are intubated, they passed it through the nose and the nose got sore. When the sore was recovering, they pulled it out and inserted [nasogastric tube] again into the nose. Doing this, they pressed the injured sore which made more pain” [42]</p> <p>“It was one of those things that you have to kind of grin and bear it” [34]</p> <p>“an infinite sense of loneliness as the most negative feeling” [3]</p> | <p>Feeling oppressed with endotracheal tube [12,21]</p> <p>Experiencing horror from being on a ventilator [29,35]</p> <p>Experiencing intubation and extubation as a source of trauma and torture [19]</p> <p>Agitated about frequent interruption of sleep [40]</p> <p>Frustrations and terror related to intubation [19,42]</p> <p>A permanent sense of torture from intubation and NG replacement [42]</p> <p>Pain of being unable to control one’s self [1]</p> <p>Feeling sad and isolated [40]</p> <p>Feeling distressed and lonely [27]</p> <p>Anxiety related to daily routine [1]</p> <p>Anxiety about excretion in bed [1]</p> | Psychological suffering and feelings of imprisonment | Torment                    |

Table A7. Cont.

| Patient Quotes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | First-Order Interpretation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Second-Order Interpretation                            | Third-Order Interpretation |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----------------------------|
| <p>“to be honest, everyone who wakes up and does not know where he is and once sees all these devices hooked to him and cannot do anything, is definitely going to have another MI [myocardial infarction] from fear” [20]</p> <p>“Today, the doctor comes and says that the operation was very good, you will get up soon and you will not have any special complications. Tomorrow another doctor will come and say that it is too early for me to comment. Maybe you will have a series of complications after the operation!” [2]</p> <p>“There is a lot of can’t... you can’t do... so all of these accumulate to a bad experience” [19]</p> <p>“From the moment you woke up you wanted to get out, to flee, you don’t want to stay even a minute longer” [3]</p> <p>“You want to calm down and you can’t... Doctors are constantly passing by to see how you are, but also to quarrel with you or your neighbor, because you are shaking and breaking the contacts from the cables” [3]</p> | <p>Feeling of shock [29,40]</p> <p>Feeling terrified by the ICU room [37]</p> <p>Fear of disability [12,22,27,34,39,41,43]</p> <p>Fear of experiencing mouth ulcers again [22]</p> <p>Hallucinations [3]</p> <p>Delusion about the hostility of ICU care team [3]</p> <p>Confused and vulnerable [2,3,19]</p> <p>The feeling of being in hell [1]</p> <p>Worrying about the emotional toll of ICU experience [2,22]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Depressive feelings and anxiety                        | Trauma                     |
| <p>“when a patient becomes ill, the ward falls apart, all the doctors and nurses are gone [leaving other patients] subconsciously restless and upset” [2]</p> <p>“You become very anxious, it is like you are fighting for your life, ... you are just getting instructions push, breath or whatever...” [19]</p> <p>“I am sure that they want to hurt me and nobody explains to me what has happened. The only thing that they cared about is my coughing.” [3]</p> <p>“Being in the ICU is “just like a little child who could not swim [and] was thrown into a cold swimming pool” [29]</p>                                                                                                                                                                                                                                                                                                                                                                                                    | <p>Feelings of intentional neglect from ICU staff [3]</p> <p>Anger, fear and frustration from not being able to talk or not being understood [3,29,36]</p> <p>The wish to go on living [43]</p> <p>To be seen [43]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Fighting for survival and to be heard by the ICU staff | Fighting                   |
| <p>“Weak in [the] body. .... [some] felt like a child, ... who doesn’t think too much, can’t do anything; can’t pee by... self, poo by ... self, can’t do anything” [25]</p> <p>“when I woke up from the coma the only thing that I confronted was fear, i.e., if I would be able to speak again because of the tracheotomy and if I would be able to walk again because I was confined in my bed...” [3]</p> <p>“felt strange... like there was a gap between [the] body and mind” [1]</p> <p>“It felt like my upper body was like an elephant, I didn’t expect my legs could carry me” [41]</p> <p>“I didn’t know what they were doing to me ... I was a body, there, available” [33]</p> <p>“like a vegetable... very defenseless and helpless” [40]</p>                                                                                                                                                                                                                                       | <p>Feeling uncomfortable over loss of body control [12]</p> <p>Experiencing loss of functional ability [19]</p> <p>A sense of losing control over self and environment [38,44]</p> <p>Experiencing a disconnect between the heart and brain [1]</p> <p>Feeling a gap between the body and the mind [1]</p> <p>Pain accompanied with gap in perception, feeling and memory [1]</p> <p>Feeling of embarrassment and loss of personal dignity [19]</p> <p>Becoming paranoid [3]</p> <p>Uncertainties about the return of bodily functions [19,38]</p> <p>Feelings of not being able to talk again when weaned off breathing supports [3]</p> <p>Being dependent on breathing devices and fear of obstructed breathing from endotracheal tube dislodgment [20,29]</p> <p>Fear that the ventilator will stop working without the nurses’ notice [25,29]</p> <p>Depending on others [21]</p> <p>Fear of not being able to breath after weaning [28]</p> <p>Sense of loneliness [2,3,19,20,28,37,38]</p> | Vulnerability and dependence                           | Altered identities         |

Table A7. Cont.

| Patient Quotes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | First-Order Interpretation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Second-Order Interpretation                                 | Third-Order Interpretation |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------|
| <p>“...I couldn’t get to sleep once, but that battle axe [nurse] said I had” [25]</p> <p>“You want to be treated as an adult instead of a child, right? Yes, I mean I’m not an engine that needs to be fixed, I mean, I’m a human being” [36]</p> <p>“you know, not giving ... updates ... you just struggle. You feel so helpless, and you wonder if you are going to die” [34]</p> <p>“we were lying on bed like vegetables, it seemed that we did not exist to the nurses, they were chatting and laughing, too noisy” [29]</p> <p>“There were moments when [patients] almost cried in despair. [They were] suffering and [care practitioners] laugh[ed] at the top of their lungs a few meters away” [33]</p> <p>“You... [ring] the bell and no one shows up. [...] It made me feel helpless, and powerless. ... what can I say, you feel hurt and you could easily start to cry.” [36]</p> <p>“someone pressed my arms and legs forcefully, some others opened my mouth and put something into my throat, after that I knew that was the tracheal tube, why did nobody tell me about it before that?” [29]</p> | <p>Horrible experience of despair and disappointments [20]</p> <p>Feeling one’s freedom has been restricted [1]</p> <p>Feeling unsafe [20,35]</p> <p>Lack of information about care process [3]</p> <p>Feeling care practitioners were disinterested in providing essential practical care for pain [3]</p> <p>Hurtful feelings of powerlessness and helplessness due to delayed care [19,25,28,36]</p> <p>Feeling defenseless and helpless [21,40]</p> <p>Feeling degraded from depending on others [21,27–29,37]</p> <p>Feeling the coldness of nurses giving care [36]</p> <p>Irritation from nurses not extubating patients on time [28]</p> <p>Sadness from feeling ignored or not being taken seriously [36]</p> <p>Frustrations from inadequate information about patients’ illness and care procedures [38]</p> <p>Frustrations from communication problems [1,19,21,22,25,28,35,40,42]</p> | <p>Experiencing the loss of emotional safety in the ICU</p> | <p>Disempowerment</p>      |
| <p>“I was very scared when I realized I was in the ICU. I told myself I was done!” [2]</p> <p>“You feel so helpless, and you wonder if you are going to die” [34]</p> <p>“when I woke up I found a tube in my throat, [...] I could not stop thinking: Was I dying soon?” [29]</p> <p>“We were four and I was the only one left. Three died, and I saw them die. ... It was not easy holding on to the bed waiting for your moment to come” [20,33,37]</p> <p>“I have no fear of dying, but always of being in pain and suffering ... the same pain, I would like to die instead. ... I thought that if (I) didn’t die soon, it would be pitiful” [24]</p> <p>I was in fear. I didn’t want to take my eyes off from the monitors. ... When the machine alarmed, I was frightened. Why did it alarm? What was happening with me?” [24]</p> <p>“I kept thinking of this: What should I do if there was anything wrong in the machine without someone knowing? Was that my last day of life?” [29]</p> <p>“I was scared because I thought the night nurse will kill me. ... so I yelled at her. ...” [31]</p>          | <p>Fear of death [2,20,21,27,29,37,40,42]</p> <p>Perceiving the proximity of death through spoken words, condition of others and the death of others [3]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>Perceiving the nearness of death</p>                     | <p>Fear of death</p>       |

Table A7. Cont.

| Patient Quotes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | First-Order Interpretation                                                                                                                                                                              | Second-Order Interpretation                            | Third-Order Interpretation |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----------------------------|
| <p>“for almost the entire [time], all the lights were on, there was no window, no clock, and [patients] didn’t have a sense of time” [3]</p> <p>“can hear all of it. . . it’s hard to explain but if you can’t sleep, can’t shut yourself down so to speak, and being afraid of all that may happen makes you scared. Yes all that makes you feel . . . I can’t hang on anymore” [36]</p> <p>“I did not know what is going on, I woke up, I felt a tube, I thought maybe I will pull a little bit, suddenly I saw the tube halfway out, so I took it out” [38]</p> <p>“when a patient becomes ill, the ward falls apart, all the doctors and nurses are gone [leaving other patients] subconsciously restless and upset” [2]</p> <p>“This thing that I put my wrist (referring to manometer connected to an arterial line) makes me both annoyed and afraid to make the slightest move, because I think it will break and be dangerous for me!” [33]</p> <p>“an artificial environment, inappropriate to the human being, [and] not compatible with human expectations” [33]</p> | <p>Losing the sense of time [3]</p> <p>A permanent sense of torture from intubation and NG replacement [42]</p> <p>Discomfort and suffering from equipment and technologies used for treatment [29]</p> | <p>ICU environment as a source of anxiety and fear</p> | <p>Hostile environment</p> |

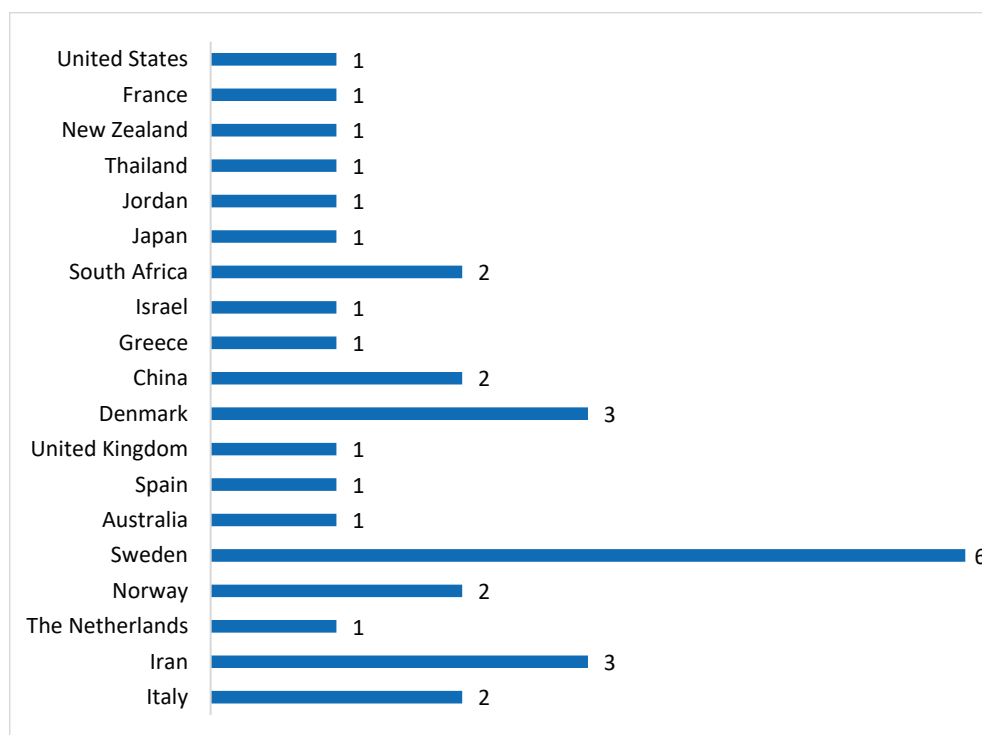


**Figure A1. Country of publication.** Italy [12,33], Iran [2,20,42], The Netherlands [36], Norway [35,43], Sweden [21,25,37,40,41,44], Australia [29], Spain [27], United Kingdom [22], Denmark [28,31,34], China [29,45], Greece [3], Israel [38], South Africa [19,32], Japan [1], Jordan [39], Thailand [24], New Zealand [23], France [30], United States [34].

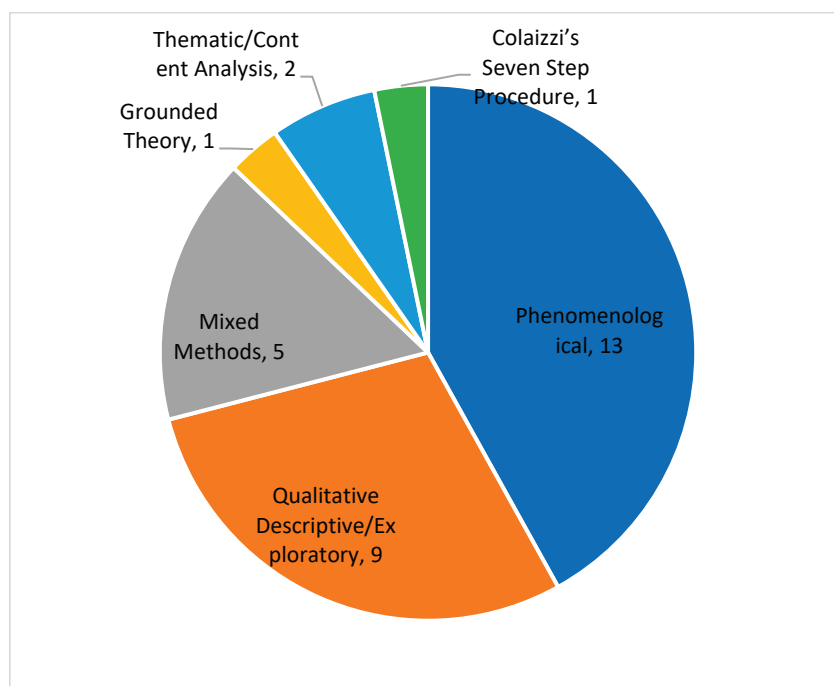


**Figure A2. Methodological and theoretical perspectives employed in the reviewed studies.** Phenomenological [12,20,22,24,25,27–30,37,39,42], Qualitative Descriptive/Exploratory [19,21,26,31,32,35,38,40,43], Mixed Methods [1,3,33,34,36], Grounded Theory [44], Thematic/Content Analysis [3,23], Colaizzi's Seven Step Procedure [45].

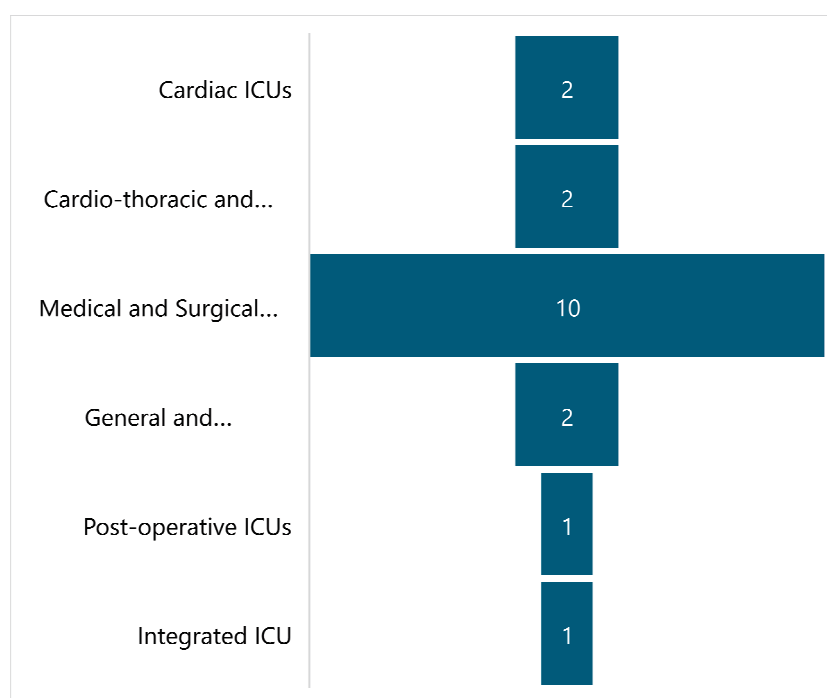


**Figure A3. ICU types.** Cardiac ICUs [12,20], Cardio-thoracic and Vascular Surgical Units [23,28], Medical and Surgical ICUs [2,19,24,25,31,34,36,38], General and Neurosurgical ICU [26,41], Post-operative ICUs [21], Integrated ICU [45].

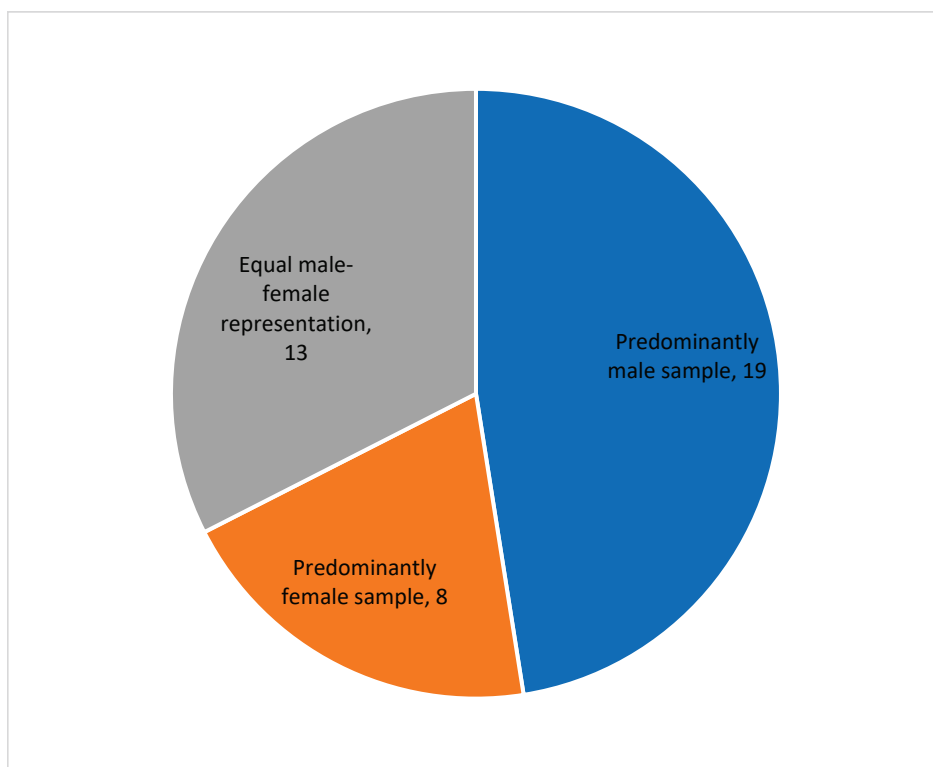


**Figure A4. Male–female composition.** Predominantly male sample [1–3,19,22–27,29,30,33–36,38], Predominantly female sample [12,20,31,36,41,42,44,45], Equal male-female representation [12,30,33–38,40–44], General and neurosurgical ICU [26,41], Post-operative ICUs [21], Integrated ICU [45].

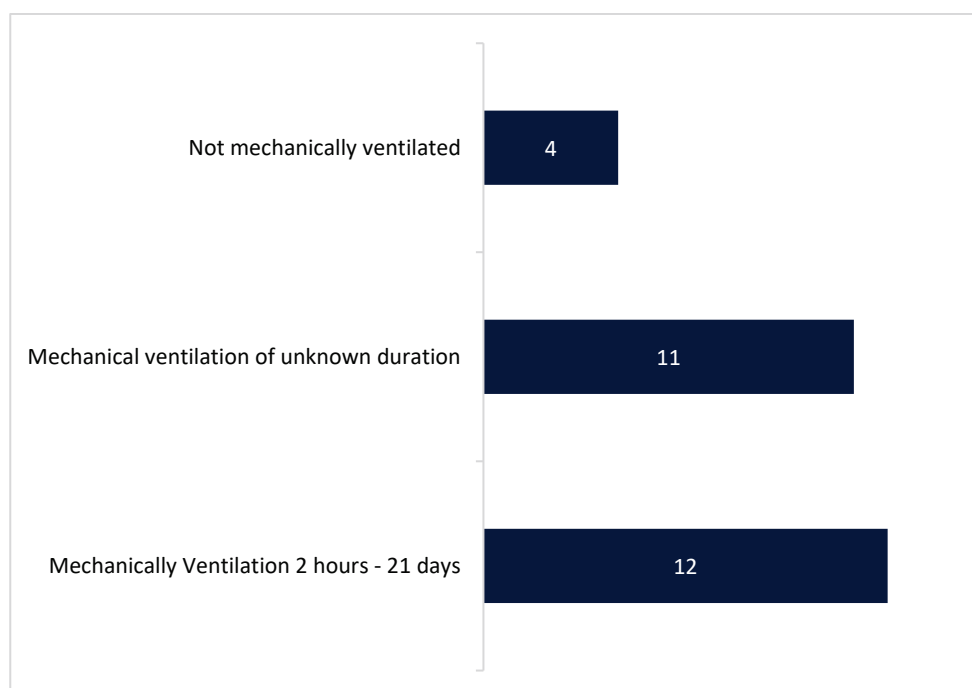


**Figure A5. Status on mechanical ventilation.** Mechanically Ventilated 2 hours—21 days [19–21,23,28,30,34–36,38,40,42], Mechanical ventilation of unknown duration [2,12,22,26,27,31,41,43–45], Not mechanically ventilated [3,24,32,37].

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## Article

# “Divergent Needs and the Empathy Gap”: Exploring the Experience of Workplace Violence Against Nurses Employed in the Emergency Department

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**Abstract:** Background/Objectives: Violence in healthcare settings, especially in emergency departments (ED), remains an important public health issue worldwide. Thus, additional insight into the effect of these incidents into nurses’ professional attitudes, their work life and related implications to patient safety issues may be valuable. We investigated ED nurses’ living experience of exposure to workplace violence by healthcare service users, with focus on the impact on them. Methods: Following a qualitative study design, data were collected (January–June 2024) through semi-structured interviews with open-ended questions and were analyzed according to an inductive, content analysis approach. Participants provided informed consent, and data collection continued until theoretical saturation was reached. Results: The sample included six nurses. Various forms of workplace violence and its psychological, social, and professional consequences were identified. Violence was more frequently perpetrated by patients’ relatives, with verbal aggression being the most common form. A fundamental divergence in needs and expectation between patients and their family members/caregivers, on one side, and participants, on the other, revealed a pronounced empathy gap. Each group remained focused on its own priorities while struggling to recognize or accommodate others’ perspectives. This lack of mutual understanding contributed to tension that, in some cases, escalated even into physically violent incidents against the participants. A similar gap was identified between the participants’ needs and administrators’ attitudes and related policies. The failure of administrative measures to bridge this gap was described as a crucial factor in further escalating conflicts and tension in the ED. Conclusions: Further research on quality improvement projects, including all stakeholders, aiming to enhance empathy in all parties involved is proposed.

**Keywords:** violence; nurses; ED; emergency department; implications; workplace violence; lived experience; patients; qualitative data; content analysis

## 1. Introduction

Violence against healthcare workers is a global concern, with detrimental consequences for individuals, healthcare systems and, most importantly, for the quality and safety of provided care [1]. Allen et al. [2] defined violence as any behavior that is intentionally used to control, punish, or oppress an individual or group of individuals through denigration and fear. According to Aljohani et al. [3], seven out of ten nurses worldwide have experienced workplace violence. Their meta-analysis of 26 studies and 9072 cases of workplace violence in emergency departments (EDs) found that 72% of incidents involved verbal violence, while 18% were reported as physical violence. Family members were

the primary perpetrators (52%), followed by patients (27%) and other relatives or friends (21%). The prevalence of verbal violence was 77%, indicating the widespread nature of the phenomenon [3].

Workplace violence manifests in different forms. Physical violence refers to any act of physical aggression that causes harm or injury through direct contact, bodily secretions, or thrown objects, including biting, scratching, punching, kicking, stabbing, or threatening gestures [4]. Verbal violence involves spoken or written language used aggressively to intimidate, threaten or humiliate a target person or group. This includes profanity, shouting, insults, derogatory comments, inappropriate commands and sarcasm [4]. Psychological violence, also known as emotional abuse, includes any non-physical abusive behavior aimed at manipulating or coercing an individual into specific actions [4]. Unlike physical and verbal aggression, psychological violence is often covert, making it harder to detect. It manifests in behaviors such as silence and ignorance, threats, guilt induction and emotional blackmail, and critical attitudes [5]. Psychological violence may also occur indirectly, such as through witnessing violent behaviors directed at others, or through exerting pressure to others to conform to coercive norms [6].

The World Health Organization in the 2000s reported that 8% to 38% of nurses globally had experienced physical violence in their workplace [5], and this prevalence is still increasing [3]. Notably, almost six out of ten workplace violence survivors have considered leaving their jobs [7]. This issue has significant effects, not only for individual nurses by leading to emotional distress and job dissatisfaction, but also for healthcare systems, since it is linked to diminished quality of care and reduced patient safety [8]. Specifically, workplace violence in ED has been associated with increased absenteeism, high turnover rates, and decreased staff morale, all of which directly affect patient outcomes [9].

Nevertheless, exposure to violent behaviors in the workplace directly affects nurse survivors in personal, social, and professional level including enduring and traumatizing consequences [7]. Although prior research underscored the immediate consequences of workplace violence, its broader impact across multiple levels of nurses' lives remains unexplored [8]. To effectively address workplace violence, a comprehensive understanding of its manifestations, consequences and coping mechanisms is essential. This is of paramount importance not only for ensuring nurses' well-being but also for maintaining high standards of quality and safety of patients' care and healthcare organizations' long-term sustainability [6].

Previous research highlighted multiple contributing factors to workplace violence against nurses [7]. A study in the Republic of Cyprus (RC) revealed as the most significant organizational risk factor long patient waiting times [10]. Additionally, individual risk factors, such as alcohol intoxication, substance use and mental illness were frequently cited as triggers for violent behaviors in EDs [10]. One of the most pressing concerns in addressing workplace violence was severe underreporting. According to Vezyridis et al. [10], almost seven out of ten workplace violence incidents remained underreported, while 74% of participating nurses in the study believed that violence was an inherent part of their work. This normalization of violence contributed to ongoing exposure and further psychological harm. Nevertheless, exposure to workplace violence has severe implications for nurses' mental, physical, professional and social well-being [10]. A cross-sectional study in Greece on workplace bullying reported that a significant proportion of participating nurses had experienced verbal abuse, with 77.6% of these incidents involving a patient's relative [11]. This study further assessed the cognitive, emotional and behavioral consequences of workplace violence on the participants, highlighting the severity of its impact on their well-being [11]. Yet, additional insight into the effect of these incidents into

nurses' professional attitudes and their work life and related implications to patient safety issues may be valuable.

Indeed, despite the severity of workplace violence in EDs, qualitative research on the topic remains scarce, particularly in the Mediterranean and South European region in the post-COVID era. The present study qualitatively aimed to explore the experience of workplace violence in nurses employed in the EDs in the RC in the post-COVID era, focusing (a) on their perceptions and interpretations of the phenomenon, (b) the impact of workplace violence on them, and (c) the coping strategies used to mitigate its impact. Existing quantitative studies have primarily focused on specific dimensions of the phenomenon, such as prevalence rates and risk factors [10,11]. However, to our knowledge, no qualitative studies have explored the experiences of ED nurses in the Eastern Mediterranean or South European regions in the post-COVID era.

Recent international research has addressed the topic from different angles. The study by Whalen et al. [12] in the USA qualitatively assessed barriers and facilitators regarding reporting of workplace violence in EDs. While their findings provided valuable insight into effective reporting, they did not explore the broader impact of workplace violence on nurses' experiences. Thomas et al. [1] explored the organizational aspect of workplace violence in Australia, but their qualitative data from 18 ED nurses were collected in the pre-pandemic period. Similarly, Hsu et al. [13], in their qualitative study of 10 Taiwanese ED nurses, explored the effects of workplace violence against nurses on quality of care and post-incident support. However, this study was also conducted before the pandemic.

Given the documented significant increase in verbal, psychological and physical assaults against frontline healthcare personnel, including ED nurses, since the onset of the COVID-19 pandemic [14], there is a need for further qualitative exploration of the topic in the post-pandemic era. A qualitative investigation into workplace violence in EDs in the Republic of Cyprus would provide valuable insights for both local and the broader European region. Specifically, a deeper insight into the dynamic of the phenomenon is expected to inform policy transformations, institutional strategies, and broader preventative measures against workplace violence, thus enhancing ED nurses' quality and safety of work life. The latter is deemed as a crucial factor linked with nurses' retention and engagement into the profession [7,9]. By retaining engaged nurses into the profession, better nurse–patient ratios and increased quality of care are achieved, as well as safeguarding optimal work conditions and clinicians' well-being, all of which are linked to better clinical outcomes [8].

## 2. Materials and Methods

### 2.1. Aim

The aim of the present study was to explore the experience of workplace violence among Greek-speaking nurses working in the ED in the RC. The focus of the study was on the participants' perceptions and interpretations of the phenomenon, with emphasis on its impact and coping mechanisms.

### 2.2. Design

A qualitative methodology, encompassing conventional content analysis approach and an inductive method was applied. Conventional content analysis is particularly appropriate for exploring under-researched topics, or a phenomenon with limited prior data [15]. Unlike methods such as thematic analysis, which often rely on pre-existing theoretical constructs, or phenomenology, which focuses on capturing the essence of lived experiences and phenomena from a philosophical standpoint, conventional content analysis allows themes to emerge directly from participants' narratives. This makes it a more relevant to

the aim of the present study, which was focused on identifying patterns and contextual dimensions in ED nurses' experience on workplace violence in Mediterranean and South European countries in the post-COVID period [16,17].

The "CASP" [Critical Appraisal Skills Programme] qualitative checklist was applied to ensure the methodological quality of the present work, and the COREQ [Consolidated criteria for REporting Qualitative research] checklist was used for the reporting of its protocol [please see Supplementary Materials].

### 2.3. Target Population and Sampling

The target population of the study was nurses employed in the ED of private and public hospitals in the RC. Aiming to gain access to the entire target population, the study was advertised via a variety of methods, including promotion by the Cyprus Nurses and Midwives Association, posting at social media and posters displayed at hospitals and national congresses. The extensive promotion of the study within the target population ensured its visibility and accessibility to the entire nursing population of emergency care, thereby facilitating inclusive participation and partial data saturation. Moreover, data saturation was further enhanced since the participants (a) were drawn from both public and private clinical settings, (b) possessed a wide range of clinical experiences, ranging from novice to highly experienced ED nurses, and (c) came from diverse educational backgrounds.

The purposeful sampling method was implemented according to the following inclusion criteria: (a) employment in the ED, (B) being exposed to any form of violent behavior from a patient or a patient's companion according to participants' reports, (c) full comprehension of the study's objectives and procedures, as this was assessed at the first meeting with the main researcher (CK), (d) written and oral informed consent to participate in the present study, (e) adequate ability to reflect on and communicate personal experiences with the researcher, according to the depth of the narrative of the first interview. Nurses who had experienced violent behavior from colleagues were excluded. There were no time-specific inclusion/exclusion criteria regarding the time since exposure to workplace violence.

The sample size was finalized to 6 nurses based on the theoretical saturation criteria determined through the simultaneous collection and analysis of data. Specifically, saturation was defined as the point at which no new themes or subthemes emerged from the data and thematic redundancy was observed across interviews. This determination followed established qualitative research standards suggesting that studies with a focused aim and a homogeneous sample may reach saturation with a relatively small number of participants [18]. Indeed, all six participants were ED nurses within similar organizational contexts and described converging experiences of workplace violence. After the fifth and sixth interviews, analysis yielded no additional codes, and the categories already identified were consistently reinforced.

Recruitment was completed when no more novel themes emerged according to the data collected analysis. At that point in time, study advertisement and recruitment strategies stopped. All those who contacted the researcher fulfilled the inclusion criteria and subsequently were included in the sample (response rate 100%). There were no dropouts from the study's sample.

### 2.4. Data Collection

Those who willingly contacted the main author (CK) were informed of the objectives and procedures of the study and were asked to be assessed on the degree to which they met the study's inclusion criteria. Following their informed consent, semi-structured, personal interviews were performed by CK (R.N., Bsc, Msc) for their data collection. This took place from January to June 2024. Interviews were conducted exclusively in Greek, since

according to national regulations, certified fluency in Greek is required for nursing practice in the RC.

Data were collected through an interview guide encompassing open-ended questions; this was developed by the researchers after an extensive literature review [2,3,16,17], based on the aim and objectives of the study. Each participant took part in two interviews, spaced 2–3 months apart, each lasting between 1 and 1.5 hours. The 2–3-month interval between interviews was maintained to allow for preliminary analysis of the first-round data and to facilitate reflective, focused second interviews, thereby enhancing the study's rigor and confirmability [15]. The second interview served as a form of member checking, aimed at confirming the preliminary analysis of the first interview and enhancing the study's trustworthiness. This follow-up allowed participants to reflect on the researchers' interpretations, clarify ambiguities, and provide additional context where needed. This approach was informed by Munhall's [19] criteria for rigor in qualitative research, particularly in terms of establishing resonance and reasonableness in the findings.

Based on the participants' preferences, the interviews were conducted online, or in a place chosen by the participants which was characterized by privacy. The following open-ended questions were included in the interview guide: 1. Please, describe to me your personal experience of incidents of violence in the ED originated from patients and/or their companions. Have you ever seen these incidents happen to others? 2. If you had such an experience in what form was this? 3. What are your feelings and thoughts about these incidents? 4. Have there been any changes in your life since your exposure to these incidents? If yes, can you give me an example? 5. How have you been coping with the impact of these incidents in your life? 6. Is there anything else that you would like to discuss?

A set of demographic data were also collected at the end of the first interview, and a data sheet was used for this purpose. Specifically, the participants were invited to provide information regarding their age, gender, and years of experience in the nursing profession, as well as in the ED.

### *2.5. Ethical Issues and Statements*

Interviews were conducted with confidentiality and the use of pseudonyms, ensuring the anonymity of the participants during data collection and analysis. If participants voluntarily disclosed their real name during the interview, the incidence was treated with strict confidentiality. Each participant was interviewed individually. Prior to each interview, a consent form was signed by the participants, thereby consenting to the management of their data according to the scope of the study by the research team, as well as to the recording of the interview. The consent form was accompanied by an information leaflet, which was provided to ensure comprehensive understanding of the study's objectives and procedures by the participants. The interviews were conducted during participants' free time to ensure confidentiality, minimize potential stigma, and prevent interference with their professional environment. It should be noted that during the interview, only CK and the participants were present.

Given the sensitive nature of discussing workplace violence, special attention was paid to monitoring and managing potential psychological distress. The interviews were conducted by the main researcher, an experienced nurse with advanced training in clinical communication and psychological assessment. During each interview, participants were continuously monitored for signs of emotional distress and were reminded that they could pause or withdraw from the interview at any time without consequence. To further support participants' well-being, they were provided with a list of accessible public mental health services. This included contact information for affiliated mental health professionals

available for follow-up if needed. Although none of the participants requested such support, several described the interview experience as therapeutic. These precautions were in line with ethical best practices and contributed to the trustworthiness of the study.

The research protocol was approved by the Cyprus National Bioethics Committee (EBK EII 2023.01.219). All procedures of the study fully comply with the Helsinki Declaration of 1975, as revised in 2008. All data (personal, demographic, educational/ vocational) collected and presented in the study were drawn from a population of 1,000,000 individuals and the subgroup of emergency care nurses (approximately 400) making it impossible to identify any participant. Moreover, the participants regularly confirmed their willingness for participation in the next phase of the study. Additionally, they were given a list of the public mental health services and the clinicians affiliated with the research team to provide support in cases of distress due to exposure to the violent incident.

## 2.6. Data Analysis

To ensure the rigor, trustworthiness and transferability of the study results, the triangulation method for data analysis was employed. Specifically, the content analysis team comprised the principal researcher (CK) and three academic collaborators (MK, MD and MM), who are well educated and experienced in qualitative data analysis. They independently analyzed each interview before collectively reviewing and validating the codes and themes generated by each researcher. This approach enhanced transparency also facilitated the integration of diverse perspectives and prevented the loss of any data, thereby ensuring the credibility of the results [15]. Overall, these peer debriefing sessions contributed to reflexivity and analytical rigor.

The content analysis process commenced immediately after transcribing one or two interviews. Prior to commencing the content analysis, the researcher transferred the recorded interview into printed form, and checked twice the accuracy of the matching of the content between the recorded and the printed material. Through collaborative efforts, code groups were established, reflecting the participants' common interpretations, descriptions and perceptions. For consistency in terminology, "violence" was used interchangeably with "aggressive behavior" as an umbrella term for psychological, verbal, and physical violence [5]. Aggressive behavior was defined as any intentional act aimed at causing harm to another individual [5]. A witness to violent behavior (whether verbal, psychological or physical) was defined as a person who was indirectly exposed to such behavior, while a survivor of violent behavior was defined as an individual who was directly exposed to it [8]. The following characteristics of aggressive behavior were coded: severity, intensity, mode of expression. "Experience" was categorized as (a) thoughts and perception (psychological processes of meaning-making), (b) behaviors (practical actions), and (c) emotions (affective response to experiences) [4].

These codes facilitated the emergence of key categories and themes. Descriptive definitions were then developed for each category, theme, and further emerging codes, ensuring clarity in data selection and interpretation. Initial categories and themes were formulated directly from the data, guided by the pre-established definitions. Yet, by following an inductive approach, the analysis was not restricted by a pre-existing theoretical framework. Subsequently, levels of abstraction were identified, allowing for the development of additional codes, categories, and themes, all grounded in the same data-driven framework. Continuous peer debriefing throughout the coding and theme development process was conducted, supporting reflexivity and consistency in interpretation. However, no external audit was undertaken.

Moreover, as part of the analytical process, the research team systematically reviewed the data for contradictory or disconfirming evidence. However, the participants' experi-

ences showed a high degree of convergence, and no substantial contradictory cases were identified. This consistency may be attributed to the shared professional context, roles, and challenges experienced by the participants.

Overall, confirmation of the study's rigor and trustworthiness followed the criteria of Munhall [19] (Table 1).

**Table 1.** Presentation of the criteria applied to ensure the rigor and trustworthiness of the study [18].

| Criterion          | Description                                                          | How the Criterion Was Supported in the Study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reasonableness     | The results constitute a reasonable interpretation of the phenomenon | <p>The findings were confirmed (a) in the phase of repeated interviews, and (b) during the presentation of the findings to the participants; Participants' expressions such as "Yes, it seems logical to me," and "Yes, it makes sense to me" were deemed as confirmatory statements.</p> <p>The integrity of the data analysis process was assured by continuous meetings of the three researchers in order to determine the degree of consensus among them regarding the findings. In the event of any differences in opinion, the researchers engaged in extensive dialogue to reach a consensus. Ultimately, all three researchers agreed regarding the study's findings.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Resonance          | The analysis of the phenomenon reverberates with participants        | <p>The analysis was corroborated through participants' feedback during iterative interviews and findings' presentations. This was evidenced by statements such as "Yes, that accurately reflects my perspective."</p> <p>Moreover, through repetitive meetings with each participant, the researcher allowed sufficient time to build a relationship which facilitated the sharing of experiences.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Representativeness | In depth interpretation of the phenomenon                            | <p>Aiming to ensure data saturation, the following measures were implemented: (a) participants came from both public and private hospitals, they had adequate work experience as an ER nurse, both genders and diverse family status (single/divorced/married) were represented equally, (b) participants were prompted to illustrate their experiences with concrete examples, thereby fostering a comprehensive understanding of their meaning, (c) interviews were concluded only when participants indicated they had exhausted their responses, using a closing query such as, "Is there anything further you'd like to include?", (d) the time spent on data collection and analysis was sufficient, considering the sample size, the complexity of the study design, and the scope of the phenomenon, and (e) all participants engaged in a follow-up interview, allowing for reflection and potential expansion or revision of their initial accounts- by conducting supplementary interviews and spending time for deepening the understanding of the data during analysis and interpretation the degree of data and theoretical saturation were enhanced.</p> <p>Additional measures were followed, aiming to reach theoretical saturation. Specifically, data collection and analysis took place simultaneously allowing for the identification of recurrent themes, while data collection was ended when additional narratives and further analysis did not contribute to the emerging themes.</p> |

Table 1. Cont.

| Criterion       | Description                                                              | How the Criterion Was Supported in the Study                                                                                                                                                                                                                                                                                              |
|-----------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Relevance       | The relevance of the study to the objectives of the qualitative paradigm | The study's conclusion draws parallels between the experiences of violence among participants and their self-perceptions, as revealed through their narratives.                                                                                                                                                                           |
| Recognizability | Readers recognize aspects of their experience in the interpretation      | The applicability of the findings regarding the consequences of violence against nurses was confirmed through the presentation of these findings to nurses from different healthcare settings and to healthcare administrators, citing expressions such as: 'What you are describing to me, I have witnessed firsthand in my department'. |

### 3. Results

#### 3.1. Participants Socio-Demographic Characteristics

The sample consisted of two female and four male participants. Their marital status varied, with three being married ( $N = 3$ ) and three unmarried ( $N = 3$ ). The participants were from the Republic of Cyprus ( $N = 5$ ) and Greece ( $N = 1$ ). Their ages ranged from 25 to 39 years. Their work experience in the ED spanned from a minimum of two years to a maximum of 12 years. All participants followed a rotating schedule, including morning, afternoon, and night shifts. Three of them held a master's degree in nursing. Their permanent residence was in three major urban areas of the Republic of Cyprus.

#### 3.2. Participants' Narratives

By delving into participants' experiences, the present findings revealed the various forms of workplace violence against nurses and its psychological, social, and professional consequences. Violence was more frequently by patients' relatives rather than by the patients themselves, with verbal aggression being the most common form.

Participants' narratives revolved around the inherent divergence in needs between patients and their family members/caregivers, on one side, and participating emergency nurses, on the other: "[...] they [patients/relatives] believe that they (patients) need to be examined immediately, and I think this puts patients in a state where they feel they need our attention right away—whether that's actually the case or not." (Haris, 6 years of work experience).

This divergence extended beyond the needs themselves to the way they were expressed, often leading to friction and misalignment in the high-stress ED environment: "[...] They usually lash out. One of the most common things is banging on doors, but other times, they'll start swearing at you." (Minas, 11 years of work experience).

A central aspect of this phenomenon was the pronounced empathy gap, since each group remained largely attuned to its own priorities while struggling to fully recognize or accommodate the perspectives of others. This lack of mutual understanding appeared to contribute to tension that, in some cases, escalated into violent episodes against the participants: "[...] why won't you just let me do my job properly? [...] And then you come and get in my way, threatening me—physically or verbally." (Ioannis, 2 years of work experience).

Furthermore, an additional layer of divergence and subsequent empathy gap was also central to participants' narratives, this time between the participants' needs, on one side, and administrators' attitudes and related policies, on the other: "[...] You face psychological harassment from supervisors and higher-ups—like, as if the violence from outsiders wasn't enough, we also have to deal with it from within." (Haris, 6 years of work experience).

The failure of current administrative measures to bridge this gap was identified as a crucial factor in escalating tension within the ED and failure to support nurses. This failure not only aggravated workplace violence but also compounded participants' distress and

professional strain: “I’ve reached the point many times where I think about switching department or even quitting the job [ . . . ]” (Anna, 7 years of work experience).

Overall, inadequate administrative interventions, lack of support, and ineffective preventive strategies further intensified the psychological and professional toll of workplace violence on the participants: “I choose to spend my free time at home because I need more time to myself now than I did before working in this department [ER].” (Ioannis, 2 years of work experience).

Five key categories emerged: (1) the surreal experience of workplace violence: forms, interpretations, and characteristics; (2) experiencing workplace violence: the traumatic and multifaceted impact on the participants; (3) coping with workplace violence and strategies for de-escalation; (4) administrative failure to manage workplace violence and the hidden dimensions of violence against the participants; and (5) participants’ expectations and proposed interventions.

The core theme, the categories and the themes/sub-themes of participants narratives are presented in Table 2.

**Table 2.** Presentation of the categories, themes and sub-themes of the present analysis.

| Core Theme                                                                                                                                                                                                                                                                                                                  | Categories                                                                                                | Themes                                                                                                                                                                                                                                                                                                                                                                         | Sub-Themes                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>The divergence in needs and the pronounced empathy gap between (a) participants and patients/family members-caregivers, and (b) the participants’ needs and administrators’ attitudes and related policies; administrative measures failure to bridge the empathy gap, contributing to tension escalation in the ED.</i> | <b>The surreal experience of WV: forms, interpretations and characteristics</b>                           | <ul style="list-style-type: none"> <li>• Participants’ awareness of WV</li> <li>• The surreal nature of WV</li> <li>• Patterns and forms of WV</li> <li>• Violation of boundaries: a profound lack of empathy and respect</li> <li>• Normalization of WV</li> <li>• Persecution, institutional neglect and lack of protection</li> <li>• Contributing factors to WV</li> </ul> | <ul style="list-style-type: none"> <li>- Individual-level risk factors</li> <li>- Patient-related triggers</li> </ul>                                                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                                                                                                                             | <b>Experiencing WV: the traumatic and multifaceted impact on the participants</b>                         | <ul style="list-style-type: none"> <li>• Personal-level impact</li> <li>• Social-level impact</li> <li>• Professional-level impact</li> </ul>                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>- Mental effects</li> <li>- Physical effects</li> <li>- Psychological effects</li> <li>- Self-perception, personal values and morality</li> <li>- Professional competence.</li> <li>- Professional identity</li> <li>- Ethical and emotional strain</li> <li>- Disruption of healthcare processes and patient care</li> <li>- Career dissatisfaction and career exit intentions</li> </ul> |
|                                                                                                                                                                                                                                                                                                                             | <b>Coping with WV and strategies for de-escalation</b>                                                    | <ul style="list-style-type: none"> <li>• Coping with violence-related trauma</li> <li>• De-escalation strategies and self-protection</li> </ul>                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                             | <b>Administrative failure to manage WV and the hidden dimensions of violence against the participants</b> | <ul style="list-style-type: none"> <li>• Institutional neglect and minimization of the phenomenon</li> <li>• Inadequate safety infrastructure</li> </ul>                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                             | <b>Participants’ expectations and proposed interventions</b>                                              | <ul style="list-style-type: none"> <li>• Institutional and administrative reforms</li> <li>• Organizational cultural and leadership expectations</li> <li>• Policy-level interventions</li> </ul>                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>WV: Workplace Violence</b>                                                                                                                                                                                                                                                                                               |                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### 3.2.1. The Surreal Experience of Workplace Violence: Forms, Interpretations, and Characteristics

Participants described workplace violence against nurses in ER as a complex and multidimensional phenomenon that profoundly impacted their personal and professional well-being.

- **Participants' Awareness of Workplace Violence**  
Their narratives revealed a deep awareness of the various forms of workplace violence, distinguishing between direct exposure and witnessing violent incidents: *"Personally, I have not experienced physical violence, but I have witnessed an incident of physical violence."* (Christiana, 2 years of work experience)
- **The Surreal Nature of Workplace Violence**  
A striking theme that emerged was the "surreal" nature of workplace violence. The participants described their experience as shocking and disorienting, evoking disbelief and dissociation: *"I was caught off guard [by this behavior] [...] and I thought to myself, 'is this really happening to me right now?' [...]"* (Christiana, 2 years of work experience)
- **Patterns and Forms of Workplace Violence**  
Participants' accounts revealed that workplace violence often followed distinct patterns, with incidents escalating over time and occurring frequently, reinforcing its prevalence in ER settings. The most common perpetrators were patients and their accompanying relatives, with verbal violence in the form of hostile comments, threats, and degrading language, being the most frequently encountered: *There were many times I found myself arguing with people in the ER because they get furious [...]"* (Harris, 6 years of work experience)  
In addition to verbal violence, psychological violence such as indirect threats and intimidation, was frequently described. These threats, particularly insinuations about filing complaints to hospital administrators, caused deep emotional distress and intense fear: *"[...] and then there's the fear that they [healthcare service users] might call and complain to the hospital administrators"* (Christiana, 2 years of work experience). Although less frequent, physical violence had even more severe consequences: *"Her behaviour and speech were quite aggressive, and when my colleague tried to escort her out, she scratched his hand, digging her nails into his skin."* (Christiana, 2 years of work experience)
- **Violation of Boundaries: A Profound Lack of Empathy and Respect**  
Workplace violence was not limited to physical attacks; participants also reported frequent violations of personal, professional, and ethical boundaries. Such behaviors demonstrated a broader lack of empathy and respect not only for the nurse participants, but also for their professional role, and the patients they cared for. Indeed, most of the time, these violations directly disrupted care for other patients: *"[...] relatives repeatedly tried to interfere with our work, constantly interrupting us—even when we were attending to other patients."* (Harris, 6 years of work experience)
- **Normalization of Workplace Violence**  
Furthermore, the recurrent nature of WV resulted in its normalization, making it an expected, almost routine part of nursing work: *"[...] the threats are too many and happen very often. [...] I wouldn't say on a daily basis [...] but at least once a month [...]"* (Christiana, 2 years of work experience)
- **Persecution, Institutional Neglect and Lack of Protection**  
Despite its widespread prevalence across emergency healthcare settings, participants felt isolated in their experiences, primarily due to a lack of institutional support and protection. Specifically, the participants expressed frustration over administrative inaction, leaving them feeling vulnerable and unsupported: *"[...] There was no arrest, no further actions—nothing. And we just carried on as if it were an ordinary day. [...] He*

*[the perpetrator] later came to apologize, but of course, I wasn't satisfied with just an apology because I had been physically attacked [...]."* (Leonidas, 12 years of work experience)

- **Contributing Factors to Workplace Violence**

**Individual-Level Risk Factors.** Participants described several personal characteristics that heightened vulnerability to violence, including gender, physical stature, and lack of experience. Discrepancies between how violence was perceived by staff participants versus administrators further contributed to underreporting and insufficient intervention: *"I always noticed that women were more often targeted for physical violence."* (Minas, 11 years of work experience)

**Patient-Related Triggers.** Patient-related factors were consistently identified as primary drivers of violent behavior. This included intoxication, disregard for hospital procedures, unrealistic expectations for care and general distrust toward medical professionals. Cultural misunderstandings and low socioeconomic status exacerbated these tensions: *"People don't take security seriously because they know the hospital won't throw them out—they'll still be treated."* (Anna, 5 years of work experience)

### 3.2.2. Experiencing Workplace Violence: The Traumatic and Multifaceted Impact on the Participants

The study findings revealed that the impact of workplace violence extended far beyond immediate physical threats, profoundly affecting participants at personal, social and professional level.

- **Personal-Level Impact: Mental, Physical and Psychological Effects**

**Mental Effects.** Workplace violence had severe mental, physical, and psychological effects on participants. The reported mental difficulties included sleep disturbances, changes in appetite, cognitive difficulties such as problems in concentration, and reduced productivity. Participants also turned to substance use as a coping mechanism: *"[...] The excess tension leads to sleep disturbances or the urge to consume alcohol in an attempt to relax."* (Christiana, 2 years of work experience)

**Physical Effects.** Physically, chronic stress and mainly the fear of provoking violent reactions from patients and their families led participants to neglect basic biological needs. The intense pressure and the unrealistic expectations the participants faced by patients and their relatives were evident: *"[...] Hours would pass without us taking a break, without me being able to drink some water or go to the bathroom—there is no time [...] and If they saw us stepping out for a break, they would get angry and start yelling, believing that we were wasting time and causing delays in our work."* [Anna, 7 years of work experience]. The physical strain of being unable to take even short breaks resulted in exhaustion, burnout and emotional distress: *"I was constantly exhausted and hopeless [...]"* (Anna, 7 years of work experience)

**Psychological Effects.** Beyond the immediate impact of the fear of verbal and psychological violence on compromising participants' physical health and self-care, the narratives also highlighted how these behaviors violated participants' basic work rights. Most importantly, patients' and relatives' misinterpretation of essential breaks as negligence rather than a fundamental right to self-care revealed an empathy gap. This lack of understanding fostered hostility and added unnecessary stress to an already demanding job. Ironically, depriving participants of basic needs may have jeopardized patient care, as fatigue may increase the risk of errors. Additionally, hopelessness, learned helplessness and avoidance behaviors were also evident, exacerbating participants' psychological distress. Repeated exposure to verbal aggression and psychological coercion from patients and families not only directly harmed the participants but also reinforced a cycle of learned helplessness: *"[...] these things happen*

*every day, and we've reached a point where we filter them out and just take them for granted."* (Haris, 6 years of work experience). Over time, they stopped asserting their needs, accepted mistreatment as inevitable, and experienced deeper exhaustion, stress and burnout: *"I leave work feeling so overwhelmed, as if they have completely drained the life out of me."* (Christiana, 2 years of work experience)

Beyond persistent tension, intense pressure and emotional exhaustion, the participants' narratives underscored enduring fear, anxiety and trauma: *"I was constantly living in fear [...] constantly feeling fear and anger [...]"* (Haris, 6 years of experience). Specifically, it was not only the threat to their physical integrity, but also the experience of extremely brutal language linked with awfully violent images was traumatic: *"[...] he said the epic line that I'll never forget! It was so traumatic [...] that he would catch me, put me on the hood of his car, and drag me around the area, until my face melted on the road."* (Anna, 7 years of work experience)

Certainly, the participants were subjected to verbal threats of physical violence, which were both dehumanizing and life-threatening. These threats had a deep psychological impact, demonstrating a profound sense of helplessness, fear, and devaluation of the participants' dignity. Such traumatic experiences were expected to have long-lasting effects on their mental health. As mentioned earlier, the normalization of violence in the participants' work environments was evident, suggesting that such experiences had become so common that they were almost expected, thus indicating how routine such aggression had become. This also hinted at the emotional exhaustion and desensitization that may occur when such violence becomes part of the everyday experience.

Moreover, these experiences led to persistent fear, heightened suspicion and difficulty in trusting others, even in the participants' personal life: *"I've become suspicious of every stranger now. Even in my personal life, I see people very differently."* (Haris, 6 years of work experience).

**Impact on Self-Perception, Personal Values, and Morality.** Repeated exposure to workplace violence significantly undermined participants' self-esteem, ethical values, and professional identity. The participants described a profound decline in self-confidence, leading them to question both their clinical competencies and their moral integrity. These experiences resulted in deep disillusionment, self-doubt and a gradual erosion of self-worth, leaving the participants grappling with feelings of worthlessness: *"[...] That I am nothing—I had such a feeling many times."* (Christiana, 2 years of work experience).

Recurring violent incidents not only eroded professional confidence but also fractured the participants' perception of personal identity, making them feel disconnected from their own sense of existence: *"There were many incidents [of violence], from patients' relatives, mostly. And [...] that was one of those that made me feel completely lost, made me feel like a loser."* (Ioannis, 2 years of work experience).

Frequent exposure to workplace violence contributed to a cycle of self-doubt and moral questioning. The participants expressed internal conflict, wondering whether they were able to meet their professional and ethical standards in such a challenging environment. Over time, these experiences seemed to blur the boundaries between professional expectations and personal values, making it harder for them to reconcile the two.

- **Social-Level Impact**

The impact of workplace violence extended into participants' social lives, straining personal relationships and fostering isolation. The participants described increased conflicts, changes in attitudes, such as heightened suspicion and difficulty maintaining familial and social connections due to emotional exhaustion, while guilt was also evident: *"[...] I would go home to my family, vent my frustrations, and that's when the fatigue and hardship would surface. [...] It was unfair for them to always hear my complaints"*

[...].” (Anna, 7 years of work experience)

The participants clearly underlined withdrawal from social interactions altogether, further deepening their isolation: *“I rarely go out anymore [...] I need more time to myself now than I did before working in this hospital department (ER).”* (Ioannis, 4 years of work experience)

- Professional-Level Impact

**Professional Competence.** Exposure to workplace violence and the resulting learned helplessness profoundly affected the participants’ self-confidence, career satisfaction, professional identity, and ability to provide effective patient care. Confidence in their professional competence and ethical standards was notably diminished: *“This experience brings down your morale and self-confidence. When someone tells you ‘you can’t do anything,’ it’s clear that in the end, you won’t be able to do anything.”* (Ioannis, 4 years of work experience)

Participants also described questioning their own professional competencies: *“I felt terrible; I reached a point where I started doubting my own abilities. Am I not a good enough nurse? Why am I being treated like this? I started thinking that maybe it’s something I’m doing wrong.”* (Anna, 7 years of work experience)

Repeated exposure to violence triggered a crisis of professional identity, leading participants to internalize external criticism and doubt their skills and competencies, potentially resulting in burnout or disengagement from the profession. This self-doubt appeared pervasive and systemic, further eroding their confidence.

**Professional Identity.** Additionally, participants frequently reported the devaluation of their professional role, particularly when they were expected to assume responsibilities outside their clinical duties, such as acting as security personnel or mediators in violent situations: *“It’s not even part of our duties, trying to protect our colleagues. In this way, we end up acting as security personnel because there’s no one else to protect us.”* (Leonidas, 11 years of experience). The ethical and professional dilemmas faced by the participants were evident, as their roles were redefined due to organizational failure or insufficient support. Being tasked with non-clinical responsibilities not only devaluated their professional identity but also conflicted with their primary responsibility to provide patient care.

Furthermore, aiming to de-escalate aggression, participants described modifying their communication style: *“Over the years, you try to avoid it diplomatically. You might need to raise your voice. Often, you have to stand your ground.”* (Minas, 12 years of experience). This shift from compassionate caregiving to defensive figure highlighted the participants’ emotional and moral strain of managing conflict. The constant navigation of this dual role contributed to emotional exhaustion and decreased job satisfaction

**Ethical and Emotional Strain.** Beyond professional and identity challenges, ethical concerns became apparent in the form of secondary victimization by colleagues: *“[...] and after a hard shift, instead of receiving a thumbs-up, they judge you and call you names [...]”* (Haris, 6 years of work experience). A lack of support from colleagues and administrators, combined with criticism and marginalization of the violence survivor, further exacerbated the emotional burden of experiencing workplace violence. This absence of solidarity and empathy among the participants weakened team cohesion, a crucial parameter in effective patient care. The resulting sense of injustice left participants feeling isolated and unsupported.

**Disruption of Healthcare Processes and Patient Care.** Workplace violence also disrupted healthcare processes, weakened therapeutic relationships, and hindered conflict management: *“[...] I find myself not being able to face that patient who was yelling at me. After everything that happened, you don’t feel comfortable seeing them again.”* (Ioannis, 4 years of work experience). This discomfort in re-engaging with patients was emblematic of the psychologi-

cal and relational toll of workplace violence on the participants. It disrupted not only the trust between them and patients, but also the therapeutic alliance, an essential element of quality and safety care.

**Career Dissatisfaction and Career Exit Intentions.** The cumulative psychological and emotional effects of workplace violence led the participants to consider leaving the profession: *“I don’t want to quit, but yes, there are times when I think about it very strongly.”* (Anna, 7 years of work experience). Prolonged exposure to violence resulted to career dissatisfaction, burnout, and increased thoughts of leaving the profession. Overall, the constant emotional strain and ethical dilemmas created an environment of reduced job satisfaction, contributing to heightened turnover intention.

### 3.2.3. Coping with Workplace Violence and Strategies for De-Escalation

- **Coping with Violence-Related Trauma**

Participants reported employing a range of both adaptive and maladaptive coping mechanisms in response to the emotional and psychological toll of workplace violence. Adaptive strategies included leveraging professional experience, cognitive reframing of violent incidents, emotional regulation, and maintaining rigid boundaries between personal and professional life. Social support—particularly from family, friends, and trusted colleagues—served as a critical buffer against psychological distress: *“Given how stressful our work is, it helps to have hobbies that release tension and prevent it from affecting your family.”* (Minas, 11 years of work experience).

Despite these protective strategies, several participants described resorting to maladaptive coping mechanisms, including emotional suppression and substance use, particularly in the absence of institutional support: *“There is so much pressure that it comes out in sleep problems, or in the desire to drink something to relax.”* (Christiana, 2 years of work experience).

- **De-escalation Strategies and Self-Protection**

Participants adopted a variety of proactive and reactive strategies to manage violent incidents. Proactively, de-escalation tactics such as calm and measured communication, culturally sensitive negotiation, and the modulation of voice and tone were employed to defuse volatile situations. Where prevention failed, participants turned to practical safety measures including team-based protection, spatial awareness (e.g., remaining near exits), and non-verbal signaling among colleagues: *“You see colleagues trying to keep you out of arguments because you’re new.”* (Minas, 11 years of work experience)

In severe cases, external intervention was deemed necessary: *“We called the police just so I could be sure I was safe.”* (Haris, 6 years of experience). Importantly, these strategies were often improvised in the absence of formal protocols. The need for standardized, evidence-based training in conflict management and institutional safety planning emerged as a central theme.

### 3.2.4. Administrative Failure to Manage Workplace Violence and the Hidden Dimensions of Violence Against the Participants

- **Institutional Neglect and Minimization of the phenomenon**

A recurring theme in participants’ narratives was institutional failure to acknowledge or appropriately respond to incidents of workplace violence. Several participants reported that administrators downplayed or ignored psychological and verbal abuse, reserving responses solely for physical violence: *“While the hospital may take legal action when there is physical violence, they often turn a blind eye when it’s verbal.”* (Anna, 5 years of work experience). This lack of recognition reinforced a culture of silence and resignation, in which nurses felt compelled to endure violence without recourse.

- **Inadequate Safety Infrastructure**

Participants also identified systemic inconsistencies in institutional safety provisions. Security infrastructure such as panic buttons or protected spaces were reportedly available in some departments but absent in high-risk areas, notably emergency departments: *“It’s ironic—some departments have panic buttons, but in the ER, where violence is most likely, we have nothing.”* (Ioannis, 4 years of work experience)

Combined with chronic understaffing and excessive workload, these deficiencies reinforced perceptions of neglect and devaluation of the nursing profession.

### 3.2.5. Participants’ Expectations and Proposed Interventions

- **Institutional and Administrative Reforms**

Participants emphasized the need for comprehensive reforms aimed at enhancing workplace safety. Key recommendations included staff training in de-escalation and trauma-informed care, the implementation of psychological support services, and consistent incident reporting systems. The reinforcement of hospital security and increased staffing were also seen as essential: *“Administrators should provide more security measures and make staff feel safer.”* (Ioannis, 4 years of work experience)

- **Organizational Cultural and Leadership Expectations**

There was a strong call for leadership to adopt a unified zero-tolerance stance on violence. Participants argued that even minor incidents should not be dismissed, as such tolerance fosters normalization of aggression: *“We must not tolerate anything—not even a small incident of violence.”* (Ioannis, 4 years of work experience)

Leadership’s role in cultivating a culture of safety and empathy was deemed essential to fostering trust and commitment among nursing personnel.

- **Policy-Level Interventions**

Finally, participants recommended structural and legislative changes, including the development of legal frameworks that ensure timely responses to violent incidents and employer accountability. Increased staffing, infrastructure investment, and national standards for violence prevention were seen as crucial to long-term change: *“We need more staff so that the public can be better served.”* (Anna, 5 years of work experience)

## 4. Discussion

Through an exploration of participants’ experiences, this study shed light on the different types of workplace violence and provided critical insights into the enduring and traumatizing effects, also uncovering the institutional and cultural mechanisms that perpetuate workplace violence in the post-pandemic era. This study also showed that relevant incidents mainly involved patients’ relatives than patients themselves, with verbal abuse emerging as the most prevalent form. To the best of our knowledge, this is the first study to explore the living experience of ED nurses regarding workplace violence in the post-pandemic context placed in the South European and East Mediterranean region.

The COVID-19 pandemic significantly reshaped the landscape of workplace violence in healthcare settings. It aggravated pre-existing vulnerabilities such as staff shortages, increased patient acuity, and public distrust toward the healthcare system [20]. In the post-pandemic years, these adverse dynamics have emphasized rising aggression towards frontline health professionals, particularly in emergency and critical care settings, while healthcare workers continue to struggle with increased stress, burnout, and professional disillusionment [21]. The emerging evidence from the present study confirmed that the intensity and frequency of the phenomenon remain alarming, contributing to its normalization among the participants.

In this context, the present study moved beyond the immediate physical and psychological consequences of violence to examine its long-term implications for professional identity, ethical values, and career trajectories in the participants, while special focus was given on participants' deteriorating mental health and institutional neglect. Previous studies have extensively documented the negative psychological and professional impact of workplace violence [7,22], often linking it to burnout, job dissatisfaction, and workforce attrition [23,24]. As one of the few post-pandemic studies situating workplace violence within this evolving context [25], the present findings not only confirmed these data but also provided a timely and much-needed analysis that may inform both policy responses and institutional reform. Indeed, international studies showed that rates of violence remained constant or even increased during the COVID-19 pandemic [26,27]; ironically, this came at a time when healthcare workers were being publicly celebrated as 'heroes' [28]. Unfortunately, the present study underscored that the extent of phenomenon remains highly disturbing.

Confirming international patterns, the present findings suggest that patients' relatives more frequently perpetrate violence against healthcare workers; indeed, data show that relatives are responsible for approximately 45–55% of incidents, with patients accounting for the remaining cases [27,29]. Furthermore, verbal abuse was consistently identified as the most common form of violence herein, as it was previously shown for ED and outpatient settings [26,30]. Importantly, the particularly novel contribution of this study regarding the identification of the 'empathy gap' between participants and healthcare service users, on one hand, and between participants and administrators—exacerbated by inadequate policies—on the other, expanded the conventional understanding of violence in healthcare. Specifically, the present findings innovatively underscored that administrators, institutional structures and colleagues may play a critical role in either mitigating or amplifying the effects, as well as the triggers of workplace violence on the participants. To our knowledge, there are limited studies that have either identified the aforementioned gap in terms of needs and expectations in individual or in administration level, or at least recognized and discussed it as such in their findings [25,26,31–33]. So far, this phenomenon has been emphasized as solely a healthcare service user-related issue, attributing violent incidents to patient-related factors such as mental illness, substance use or high-stress medical environments [8,25,31,32,34]. These elements—with the exception of mental illness—were also confirmed in the present findings.

#### *4.1. Instructional Failure and the Impact of Workplace Violence*

What emerged as notably damaging for the participants was the lack of institutional support, peer solidarity, and administrative responsiveness to their exposure to violence. This dissonance between the support the participants expected from administrators and colleagues, and the actual response received was deeply traumatic for them. The studies by Gates et al. [35] and Spector et al. [36] previously suggested that institutional failure to address workplace violence exacerbates its impact on healthcare professionals. Following administrators' unsupportive responses, the participants herein reported feeling abandoned, dismissed, and even blamed by the administrators for the violence they endured, reinforcing their perception that their suffering was invisible or trivialized. This phenomenon of victim blaming by colleagues and administrators further engendered feelings of being unsupported, invalidated, or isolated. Apart from its traumatic impact on the participants, victim blaming was also linked with their inclination to report incidents or seek assistance, as they were apprehensive about being blamed or their claims being disregarded. Uncovering this deficit in support and solidarity within the work settings, the present study also provided concrete evidence that workplace violence is not just a momentary occupational hazard but a sustained and systemic issue reinforced by organiza-

tional neglect. Moreover, the failure of administrative measures to address this disconnect and bridge this gap was also seen as a crucial factor in escalating tension within the ED.

These findings are in alignment with the wider literature, which has consistently demonstrated that organizational responses play a crucial role in either mitigating or perpetuating the effects of workplace violence. For instance, Liu et al. [37], in a systematic review and meta-analysis, emphasized that lack of institutional support significantly contributes to the underreporting of incidents, further entrenching a culture of silence and tolerance. Similarly, Vento et al. [26] and Banga et al. [27] reported that healthcare workers often feel disempowered and abandoned by managerial staff when violence occurs, particularly in high-pressure environments such as EDs. Additionally, Sari et al. [29] highlighted that inadequate administrative handling of violence incidents increases staff dissatisfaction and undermines their trust in the system, ultimately affecting their willingness to continue in their job. Moreover, Onal et al. [30] underlined the failure of healthcare institutions in the Eastern Mediterranean region to establish effective reporting and protection mechanisms, noting a direct link with perceived administrative neglect and heightened emotional distress among staff.

This evidence highlighted an urgent ethical and managerial challenge on how institutions may foster a culture that prioritizes healthcare professionals' well-being and psychological safety, dignity and trust, and subsequently patients' safety. Formal protocols must not only respond to incidents but actively work to prevent them. Administrators play a pivotal role here; their visibility, empathy and responsiveness can either bridge or widen the empathy gap. Aligned with this consideration, the study by Nouri et al. [38] revealed that the main hindrance to establishing a respectful work environment in nursing was the feeling of being ignored, receiving inadequate feedback and un-addressing problems.

Furthermore, while earlier studies have focused on the physical and emotional toll of violence [22,26,34], the present study uniquely captured how the erosion of empathy within healthcare institutions contributed to professional alienation and moral injury. This negative impact on participants' empathic attitudes also compromised patient safety. They noted that unresolved exposure to violence and chronic institutional neglect led to emotional detachment, increased irritability and decreased capacity for compassionate care. These dynamics mirror findings from earlier studies suggesting that burnout and emotional fatigue can diminish nurses' attentiveness and responsiveness [23]. Hence, the consequences of workplace violence extend beyond staff well-being; they pose a direct threat to the quality and safety of patient care.

The dual focus on adaptive and maladaptive coping strategies provided a nuanced understanding of how nurses navigate workplace violence. While previous data support the importance of effective coping mechanisms, generally focusing on resilience-building strategies [39,40], the present study uncovered the darker realities of coping mechanisms, including substance use, emotional detachment, and self-blame alongside the de-escalation attitude "of being the calm in the storm" using techniques of controlled communication and cultural sensitivity, confirming previous data [41]. Although these findings align with recent studies on the hidden psychological costs of workplace violence [22], they mainly extend the conversation by illustrating how coping strategies are shaped by institutional neglect rather than personal shortcomings.

Furthermore, the present findings highlight the complex interplay between systemic and cultural factors in workplace violence. Compared to previous research [25], the present study took a holistic approach, uncovering how gender, physical characteristics, power imbalances and patient-related factors (e.g., intoxication, unrealistic expectations, cultural tensions) intersect to shape the prevalence and severity of experienced violence in the workplace. By doing so, the present study moved beyond simplistic explanations of

workplace violence and instead presented it as a deeply embedded structural issue that requires urgent institutional reform, confirming previous data.

#### 4.2. Implications for Practice

These findings call for a shift in the discourse from individual resilience to structural accountability. Sustainable solutions must prioritize the development of healthy, supporting coping mechanisms for nurses while holding systems accountable, rather than leaving them to manage trauma in isolation. This requires institutional reform, targeted on two pillars simultaneously—the nurse–service user pillar and the nurse–administrator pillar—by aiming to bridge empathy gaps.

From a policy perspective, previous recommendations emphasize structural and procedural reforms to ensure staff safety and well-being [42]. The American Nurses Association [43] advocates for zero-tolerance policies and peer support systems that not only penalize aggressive patients but also hold administrators accountable for neglecting staff well-being. The enhancement of hospital security infrastructure, including panic buttons and crisis response teams, and adequate staffing access to mental health resources are also proposed [44]. Additionally, mandatory de-escalation and cultural competency training have been considered essential in preventing violence and improving staff preparedness [2,41], while there is a pressing need for stronger legal protections for nurses. Towards this goal, policymakers were considered to support the following: (a) legislation that criminalizes acts of violence against healthcare workers, ensuring swift legal action against offenders, and (b) workplace violence protection laws that require hospitals to meet minimum safety standards and establish formalized intervention protocols [41,42]. Focusing on the under-reporting of violent incidents, an issue clearly reported herein, anonymous reporting mechanisms and clear response protocols to encourage transparency without fear of retaliation are also needed [44]. However, even these will fall short unless paired with cultural change and clear institutional commitment. Reporting should not be seen as a risk but as a protected right and professional responsibility, reinforced by leadership.

Despite the importance of these interventions, the empathy gap between nurses and patients/service users must be addressed with equal urgency. Unrealistic expectations, miscommunication, and cultural disconnects were recurring themes in our data. Interventions designed to reduce violence must include education for patients and families about healthcare system constraints, staff limitations, and acceptable behavior. For instance, monitors and leaflets in waiting rooms explaining the routine of the ED, related procedures and expected waiting times may result in enhanced understanding in service users about nurses' tasks and delays in receiving care. Nurses, in turn, must be supported with communication tools and structured spaces for emotional reflection. Interventions that cultivate mutual respect—through workshops, co-designed policy development, or empathy-building campaigns—are likely to yield longer-lasting outcomes. Empathy is not merely an interpersonal trait; it is a structural requirement. Its absence was identified by participants not only as a cause of violence but as a reason for its escalation and persistence.

Overall, the present findings support the articulation of interventions developed on the basis of a participatory approach, with focus on how to bridge the empathy gap between stakeholders. Thus, relevant projects need to include all three groups of them, i.e., nurses, patients and the families, and administrators, aiming to enhance each groups' empathic understanding, and cultivate a culture of civility. By fostering empathy and open communication, such interventions may not only improve the psychological safety of nurses but also contribute to greater patient satisfaction and reduce aggression in clinical encounters, all resulting in better clinical outcomes.

#### 4.3. Strengths and Limitations

The key strength of the present study was its post-pandemic perspective, as it acknowledged that workplace violence cannot be examined in isolation from broader societal changes. By situating workplace violence within this evolving context, this study provided a timely and urgently needed analysis that may inform both policy responses and institutional reforms. Additionally, the revelation of the “empathy gap” as a core theme strengthens the impact of the study. This finding is expected to challenge the conventional understanding that violence in healthcare is solely a patient-related issue [8]; instead, the present findings showed that colleagues, administrators and institutional structures play a critical role in the dynamic of the phenomenon.

Regarding the limitations of the present study, one may highlight the sample size of six participants as a limitation regarding the extent to which these findings may be transferred to the broader population. Similarly, the unique characteristics of the healthcare system of the RC may restrict the transferability of the findings to other contexts. However, the data and theoretical saturation that were achieved herein support the credibility, dependability and confirmability of the study [15]. Indeed, theoretical saturation was achieved, as no new codes or themes emerged during the final interviews. This is consistent with guidance from Guest et al. [18], who found that saturation can occur within the first six interviews when the study focus is clear and participants share common experiences. In our case, all participants were ED nurses operating under similar organizational structures and reporting analogous experiences of workplace violence, supporting thematic redundancy. Nonetheless, the limited sample size is acknowledged as a methodological constraint, and future research with a broader and more diverse sample is recommended to enhance the comprehensiveness and transferability of the findings [45]. The absence of contradictory or disconfirming data may also reflect the relative homogeneity of the participant group, as all of them shared similar roles, work environments, and exposure to workplace violence. While this consistency reinforces the coherence and dependability of the findings, it may limit the diversity of perspectives represented. The influence of researchers’ positionality and possible selection bias in participants’ recruitment also need to be considered.

On the other hand, the exclusive reliance of data collection on personal interviews may pose restrictions on the depth of understanding which could have been achieved through data triangulation with other methods, such as observation or journal keeping. Yet, the participants provided insightful narratives following comprehensive reflection of their experiences, as was shown by the extent of the paradigms provided and the dimensions of the phenomenon described. Additionally, the potential recall bias among participants when recounting past experiences could have influenced the accuracy of the data collected. To address this limitation, during the repeated interviews, the participants had the chance to enrich and confirm their narratives. Furthermore, since English was not the researchers’ mother language, the accuracy of transferring participants’ data from their native language to the present form may have biased their interpretation. Aiming to eliminate this limitation, the translation of quotes was confirmed by a software for professional translation and was further validated by a bilingual research associate. Nevertheless, the strength of the present study may be attributed to the insightful experiences and subsequent powerful narratives of the participants described herein for the first time within this particular cultural context. This adds important and novel information to the current literature on the subject. Most importantly, since the participants’ findings are based on both data and theoretical saturation, they may be deemed as representative of the target population and its work-related and cultural context from which they were collected, i.e., Greek-speaking emergency nurses employed in public and private settings in the RC. Indeed, the present analysis was based on a multi-layered approach, which integrated qualitative

data from a diverse sample of emergency nurses. By capturing the living experiences of nurses with varying levels of expertise (2–12 years) and across different departments coming from both the public and private sector, the current study provides a dynamic and intersectional understanding of workplace violence. The qualitative depth of the narratives allowed for a more humanized exploration of violence, highlighting not only its external manifestations but also its internalized consequences, such as self-doubt, moral distress and career dissatisfaction.

## 5. Conclusions

This study contributes a critical post-pandemic perspective on workplace violence, highlighting not only its psychological and professional impact but also the institutional failures that sustain it. By identifying the empathy gap as a core theme, this research challenges the prevailing discourse that views violence as an inevitable occupational risk, instead framing it as a preventable systemic and relational failure. To bridge these divides, future intervention studies should examine strategies that cultivate empathy across all levels, including trauma-informed care training, patient–staff communication frameworks, and organizational practices that value emotional intelligence. Administrators should implement policies that go beyond punitive responses, emphasizing transparent reporting, proactive staff support, and patient education initiatives. By addressing both institutional and interpersonal dimensions of empathy, healthcare systems can better safeguard the safety, dignity, and sustainability of emergency nursing.

**Supplementary Materials:** The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/healthcare13101118/s1>, Table S1: Assessment of the rigor of the present study according to the CASP tool; Table S2: The COREQ tool assessment as it was applied in the present study.

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## Abbreviations

The following abbreviations are used in this manuscript:

|    |                      |
|----|----------------------|
| ED | Emergency Department |
| WV | Workplace Violence   |
| ER | Emergency Room       |

ANA American Nurses Association  
 AHA American Hospital Association  
 RC Republic of Cyprus

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## Article

# Early Mobilization of Critically Ill Patients: A Survey of Knowledge, Practices and Perceptions of Greek Physiotherapists

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**Abstract:** Background/Objective: Early mobilization (EM) of critically ill patients is a feasible and safe intervention that limits the implications of bed rest and improves lung function. However, its limited implementation suggests a gap between the research evidence and clinical practice. It is widely accepted that early mobilization faces a variety of barriers. This study aimed to investigate the perceptions of Greek physiotherapists on EM barriers and record their knowledge and practices. Methods: We conducted an electronic survey using the online platform “Microsoft Forms”, among critical care physiotherapists in 66 hospitals that had an Intensive Care Unit (ICU) department in Greece in 2024. We administered a questionnaire, developed based on valid and reliable international questionnaires, with the following domains: education and knowledge on early mobilization, practices, perception regarding EM, and perceived barriers to early mobilization. Results: A total of 126 Greek physical therapists participated. The majority of them worked in urban area hospitals and in a rotation schedule around all departments. Most physical therapists stated that early mobilization is a priority for the patient’s rehabilitation and an important factor in preventing the complications of bed rest. Yet, they do not use specific protocols. Most had knowledge of what EM involved and the international guidelines. The most common barriers reported were the hemodynamic instability and the incoherence with the ventilator. Dedicated physiotherapists singled out certain barriers like the presence of delirium and the lack of communication among ICU staff. Additionally, physiotherapists with more years of experience did not acknowledge tubes, connections, femoral lines and Body Mass Index (BMI) as barriers. Conclusions: Most Greek physiotherapists believe that early mobilization is crucial for the rehabilitation of critically ill patients. A significant percentage know the guidelines, yet they do not follow a specific protocol. Various barriers prevent its implementation, which depends on the patients, healthcare providers, and the overall process. Yet, It is recognized that practices and perceived barriers are influenced by experience and work schedule. Establishing clinical protocols is essential to facilitate the implementation of early mobilization and support patient rehabilitation. Future efforts should focus on designing strategies and EM protocols for physiotherapy in Greek ICUs. Also, we need to monitor changes in perceived barriers across other countries as focus on the matter via published studies and clinical seminars could lead to significant changes.

**Keywords:** early mobilization; intensive care units; barriers; perception; physical therapists

## 1. Introduction

Many patients in the Intensive Care Unit (ICU) are often confined to bed rest [1,2]. This immobilization has detrimental effects on their physical and mental functioning, including reduced muscle strength, increased mechanical ventilation duration, and prolonged length of stay in ICU and hospital [1]. Also, the lack of mobilization has been shown to result in up to 40% muscle mass loss in the first week and 1% bone density loss per week [3]. The most reliable intervention for preventing these complications is early mobilization (EM) [2,4]. This is defined “as mobilization within 72 h of ICU admission, which is feasible and well-tolerated by most patients once they are stable” [5]. It involves a progression of a series of activities from passive and active range of motion to full ambulation throughout ICU stay [2]. Many studies have shown that this intervention is safe and feasible in critically ill patients [6]. A variety of benefits of EM have been reported such as improved physical and mental function, reduced ICU length of stay, and quality of life [6].

Despite its potential advantages, EM is not widely implemented [7,8]. Numerous international studies have reported a low prevalence of out-of-bed mobilization, especially among intubated patients on mechanical ventilation [7,8]. For example, a 1-day German point-prevalence study of which included 783 mechanically ventilated patients across 116 ICUs found that only 24% of these patients were mobilized out of bed as part of routine care. Among patients with an endotracheal tube, this number dropped to just 8% [8]. Similarly, a study in southern Brazil revealed that only 10% of all mechanically ventilated patients and a mere 2% of patients with an endotracheal tube were mobilized out of bed [9].

Several studies have examined why EM is not commonly implemented in ICU clinical practice [10–13]. The gap between research evidence and clinical practice highlights the presence of various barriers [10–12]. Previous publications have categorized these barriers to EM into three domains: (1) patient barriers, such as patient symptoms and conditions, endotracheal tubes, monitors and catheters; (2) provider barriers, such as limited human and technical resources and insufficient training; and (3) institutional barriers related to the ICU culture, lack of proper guidelines, lack of coordination, and lack of rules for the distribution of tasks and responsibilities [11,12].

Many studies have investigated these barriers at the local and international levels to identify them and design strategies for their resolution [14,15]. In Greece, ICU physiotherapists practice both EM and respiratory techniques [16,17]. A recent study found that while 50% of participating ICU physiotherapists were aware of early mobilization guidelines, only 19% reported implementing them [16]. To date, there has not been a study examining the barriers to implementing early mobilization which act as inhibitors in promoting the recovery of critically ill patients in the ICU [18]. The primary aim of the present study was to identify physiotherapists’ knowledge and practices regarding EM. It was also to identify their perceptions of barriers to EM in Greek ICUs. The secondary aim was to examine whether these results have been influenced by participants’ years of work experience or dedication in the ICU.

## 2. Methods

### 2.1. Study Design: Survey Development

This was an electronic survey study that was conducted from May 2024 to November 2024. The questionnaire used was developed by a panel of experts who systematically reviewed similar published studies [10–15,18–22]. The panel comprised one registered nurse and four physiotherapists, all with a PhD and extensive experience in the ICU setting. The questionnaire that was developed was divided into the following domains, which focused on: participants’ knowledge of early mobilization (6 items), practices (7 items), perception on EM (11 items), and perceived barriers (29 items) to its implementation. Before

these domains, we also included four questions regarding sociodemographic variables such as: sex, age, residential area (urban, rural, etc.), and educational level. Considering the barriers identified by the initial systematic review of literature, we divided them into the following categories: patient-related, institutional, provider-related, and cultural barriers. The survey included only closed-ended questions. The format of the responses varied, but mainly included: “Strongly agree-Agree”, “Neutral”, “Disagree-Strongly disagree”, and “Yes”, “Don’t Know”, and “No”.

The questionnaire was developed as an electronic survey using the online platform “Microsoft Forms”. To evaluate comprehensiveness and identify any unclear items that would need modification, we emailed the link of the e-questionnaire to thirty physiotherapists with long service in the ICU in Athens and Thessaloniki. This pilot study pointed out a few syntax issues that were corrected after discussing them among the panelists and consensus was reached.

## 2.2. Survey Administration: Data Selection

In order to identify physiotherapists working in the ICUs, we created a list of all Greek hospitals from the main webpage of the Health Ministry, and contacted them to identify which of them had an ICU department and to gather all contact information for the physiotherapy departments. We contacted the head physiotherapists of each hospital, and sent the questionnaire link to the departments’ email addresses. However, the exact number of ICU physiotherapists could not be determined due to the absence of an official registry, as most physiotherapists are not exclusively employed in Greek ICUs. Additionally, the questionnaire was posted via social media and in special interest groups related to ICU physiotherapy and ICUs. All Greek physiotherapists that had experience and have worked in the ICU were requested to complete the survey.

Ethical approval was obtained from the ethics committee of the University of West Attica (41564/26 April 2023). Participants completed the survey voluntarily. Also, their anonymity and confidentiality were assured via the online platform. Along with the questionnaire, we included a covering letter explaining the purpose of the study, identifying the corresponding researcher, assuring privacy, and describing the process of handling their responses and any personal data.

## 2.3. Statistics

The SPSS Statistics (Version 21, IBM, Armonk, NY, USA) for Windows software was used for descriptive frequency analysis. Descriptive statistics were used to summarize the responses for all items, along with bar graphs to present our findings.

# 3. Results

## 3.1. Participants

A total of 126 physiotherapists working in Greek ICUs participated in the survey. Among participants, (a) 65% were women, (b) 42% had obtained a master’s degree, and (c) 44% (the largest percentage) were 40–49 years old. Furthermore, 58% of the participants had more than seven years of experience working in the ICU. Most physiotherapists worked on a rotational basis across different hospital departments, with only 20% dedicated solely to the ICU. The largest percentage of participants (43%) noted that this rotation was performed every 3 months. Additionally, 87% of respondents were employed at public hospitals located in urban areas, 75% noted that they did not have a daily afternoon shift, and 62% had a weekend shift. The majority of our ICUs are multidisciplinary, with less than 15 beds. The physiotherapists to patient’s ratio in most cases was 1 to 10–15 patients,

depending on the total number of ICU physiotherapists and the presence of more than one ICU department.

### 3.2. Knowledge (Supplementary Table S1)

According to the data, 38% of participants received training from a senior colleague, while a similar percentage (30%) attended training seminars, workshops, and relevant conferences (Figure 1). Most of the physiotherapists (94%) reported being aware of the benefits of EM. Approximately two-thirds of the respondents indicated they were familiar with the safety criteria for initiating (70%) and discontinuing (75%) EM. Although 81% knew what EM involved, 39% said they lacked sufficient understanding of the European Society of Intensive Care Medicine guidelines for preventing post-ICU syndrome.

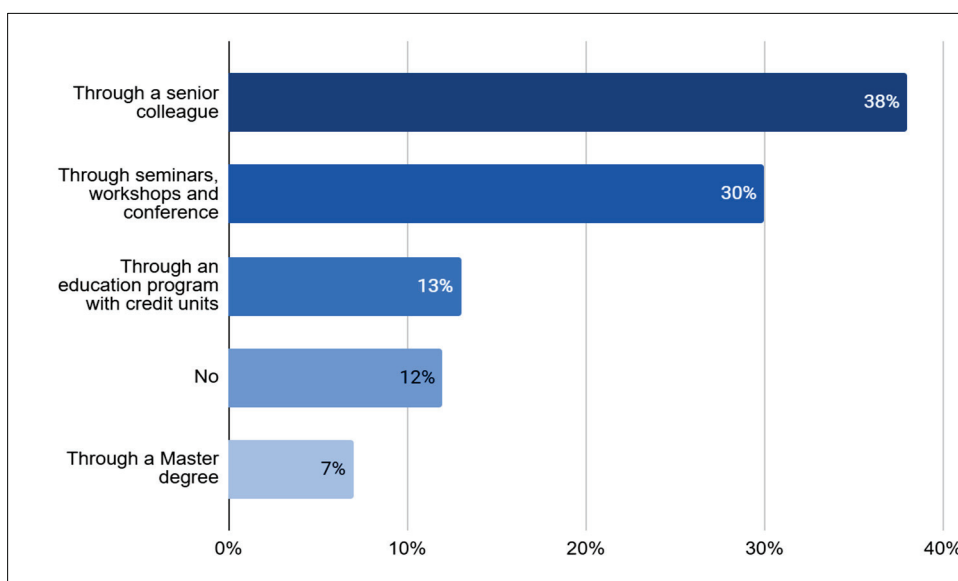


**Figure 1.** Participants' training resources.

### 3.3. Practices (Supplementary Table S2)

Among the physiotherapists surveyed, 71% reported that they do not follow any specific protocol for implementing EM, yet 55% noted following clinical guidelines on the matter. Additionally, 25% indicated they do not utilize the ABCDEF bundle, and this could potentially be higher, considering that 44% of participants were unable to provide an answer. Furthermore, 67% of the participants do not take part in the morning physicians' briefing, while 86% wait for the physician's referral before implementing EM.

### 3.4. Perceptions (Supplementary Table S3)

Most physiotherapists (85%) believe that EM is a top priority for patients' rehabilitation and a crucial factor (99%) in preventing complications from immobility. Additionally, a similar number of participants (92%) agree on the importance of having a protocol for the safe implementation of EM. Furthermore, a significant majority (96%) support the idea of using a bundle of practices like the "ABCDEF" framework. The participants (73%) feel that physicians are in favor of EM of patients, but are not sure whether the nursing staff share the same opinion.

### 3.5. Reported Barriers Regarding the Implementation of EM

Although physiotherapists believe that intensivists are in favor of EM—with 73% supporting this view—several barriers to EM have been identified and reported. The most perceived barriers related to patients include hemodynamic instability (94%) and

difficulty with ventilator synchronization (61%). In contrast, most responders disagreed that the endotracheal tube (81%), muscle weakness (79%), and poor nutritional status (56%) posed barriers to EM. Additionally, a significant proportion of physiotherapists emphasized the importance of training (94%), and having an EM protocol (92%) or clinical guidelines (96%) are important. Consequently, the lack of these resources is seen as an institutional and provider-related obstacle to facilitating EM. Regarding the equipment used in ICUs, opinions were divided: 36% of physiotherapists agreed on its adequacy while 40% disagreed. Moreover, most respondents reported that the requirement for a physicians' order before mobilization (86%) is the most frequent process-related barrier. Lastly, the potential of musculoskeletal self-injury was also recognized as a barrier by 76% of physiotherapists. All answers regarding perceived barriers on EM are presented in Supplementary Table S4.

### 3.6. Work Schedule Variances

We observed variances in Greek physiotherapists' knowledge, practices, and perceived barriers related to their ICU work schedules. As mentioned earlier, only 20% of the participants were dedicated solely to the ICU, while 80% worked on a rotation basis across different hospital departments. A significant percentage of participants (43%) indicated that this rotation occurred every 3 months. Among those dedicated to the ICU, the majority also covered shifts on weekends and public holidays (80%) compared to only 57% of those who did not work exclusively in the ICU.

Regarding their knowledge, most participants (80%) included in the survey stated that they were aware of what EM involved. Interestingly, when asked if they knew the criteria for initiating and terminating the procedures, the dedicated physiotherapists up to 84% gave a positive answer in relation to others whose positive answers reached 73%.

Concerning EM practices, 60% of the physiotherapists dedicated to the ICU reported participation in morning briefings with doctors, compared to only 24.8% of the physiotherapists on a rotational schedule. Additionally, up to 48% of dedicated ICU physiotherapists reported keeping a daily record of the patient's mobilization plan, whereas only 36% followed a protocol for EM. In contrast, physiotherapists on a rotational basis recorded this information up to 38% of the time, with only 19.8% utilizing an EM protocol. Lastly, 84% of physiotherapists who are not dedicated to the ICU reported initiating EM only after receiving written commands from the intensivist, compared to 60% of the dedicated physiotherapists.

As to perceived barriers to EM (Figure 2), 34% of dedicated physiotherapists noted delirium as a barrier, compared to 73% of their counterparts. Similarly, regarding Body Mass Index, 20% of dedicated physiotherapists identified it as a barrier, compared to 27% of others. Additionally, none of the dedicated physiotherapists recognized the presence of an endotracheal tube as a barrier, while 7% of the other physiotherapists did. The presence of a femoral line was seen as a barrier by 9% of dedicated physiotherapists compared to 4% of others; for sedation, these figures were 40% versus 50%. Moreover, when asked to identify hemodialysis sessions as barriers, dedicated physiotherapists provided more positive responses, with 44% indicating it was a barrier compared to 34% of others. In terms of patient refusal being viewed as a barrier, 47.5% of physiotherapists working on a rotational basis agreed with this statement, while only 16% of dedicated ICU physiotherapists shared the same opinion. Notably, an increased percentage of dedicated physiotherapists (40%) did not provide an answer to this question, compared to 20% of their counterparts.

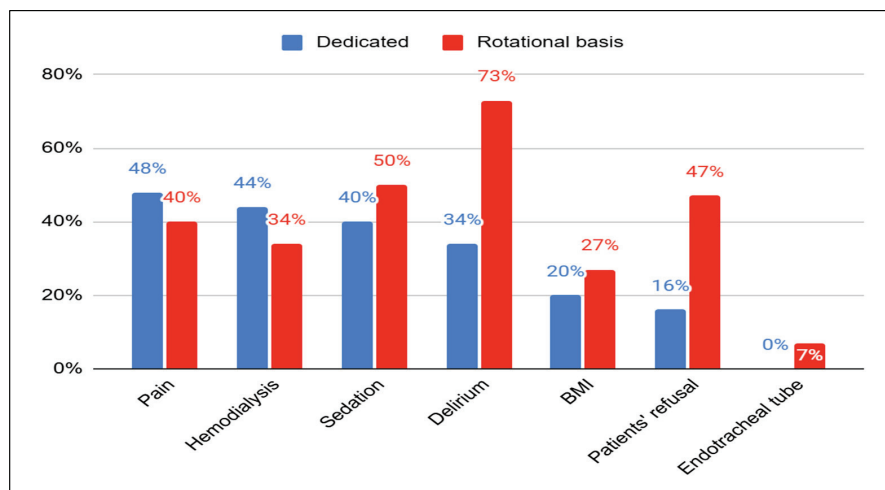


**Figure 2.** Perceived barriers to EM between dedicated ICU physiotherapists and those working on a rotational basis.

In relation to the equipment necessary for implementing EM in the ICU, 16% of dedicated physiotherapists indicated that the available equipment is sufficient, whilst 40% of their non-dedicated colleagues shared this view. Furthermore, when examining barriers such as shift duration and the number of physiotherapists available, we found that a greater percentage of dedicated physiotherapists were unable to provide a clear response (32%, compared to 15% for shift duration, and 20% compared to 10% for adequate physiotherapists).

### 3.7. Years of Experience in ICU Variances

As mentioned earlier, 58% of the participants had over 7 years of work experience in the ICU, while 24% had less than 3 years of experience, and the remaining 18% had between 3 and 7 years. Regarding their knowledge of the ESICM guidelines for preventing post-ICU syndrome, 49% of the physiotherapists with more years of experience responded “Yes”, compared to 35% of those with less experience. Additionally, physiotherapists with more years of experience were more likely to provide positive responses regarding their knowledge of initiating, terminating, and identifying contraindications for early mobilization practices (Figure 3).

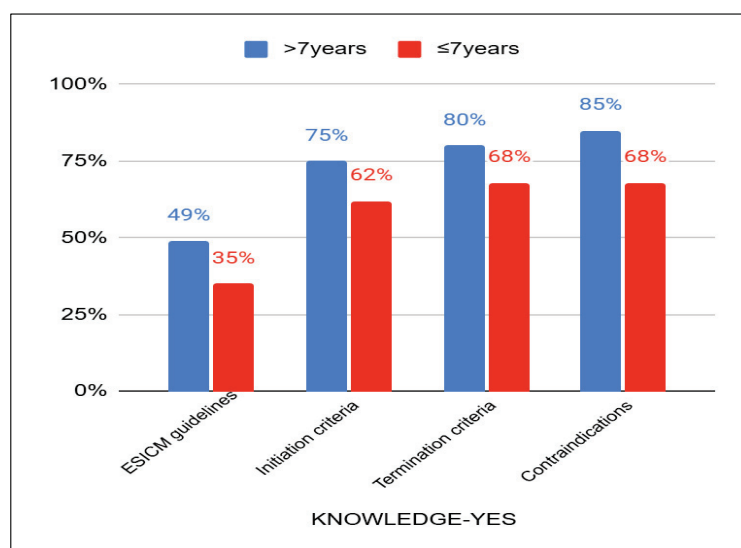


**Figure 3.** Knowledge of guidelines and EM safety criteria to years of experience between those with >7 years and ≤7 years.

When considering patient-related barriers, physiotherapists with more than seven years of experience reported a lower percentage of acknowledgment for certain issues, such as delirium (38%), pain (37%), severity of illness (30%), fatigue (27%), Body Mass Index (18%), lack of motivation (14%) invasive lines (3%), endotracheal tubes (4%), and femoral lines (3%) compared to those with less than seven years of experience (Figure 4). Physiotherapists with less than three years of experience seem to encounter more challenges with patients who are in pain (53%) and those who exhibit a lack of motivation (30%).

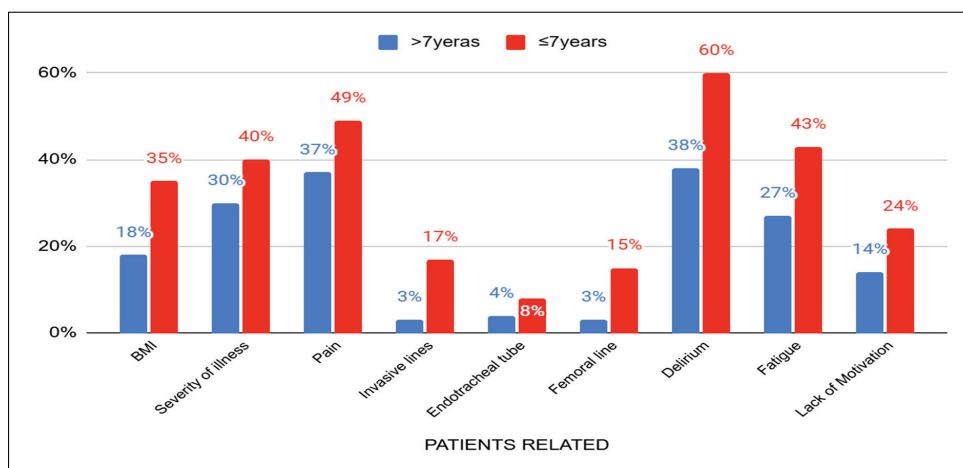


**Figure 4.** Acknowledgement of patients related barriers to years of experience between those with >7 years and ≤7 years.

In the categories of barriers related to institutional factors and healthcare providers (Figure 5) those with more than seven years of experience showed a higher percentage of agreement in recognizing safety issues (80%) and delays in decision-making (55%) regarding the initiation of EM. Furthermore, a greater number of these experienced physiotherapists believed that the lack of guidelines (65%) and the ABCDEF bundle (41%) represent a significant barrier to EM. In contrast, physiotherapists with less than three years of experience identified certain institutional barriers as significant obstacles. Specifically, they cited issues such as the necessity of a physician's order to mobilize patients (97%), a limited number of physiotherapists (67%), time constraints (63%), and insufficient equipment (43%).

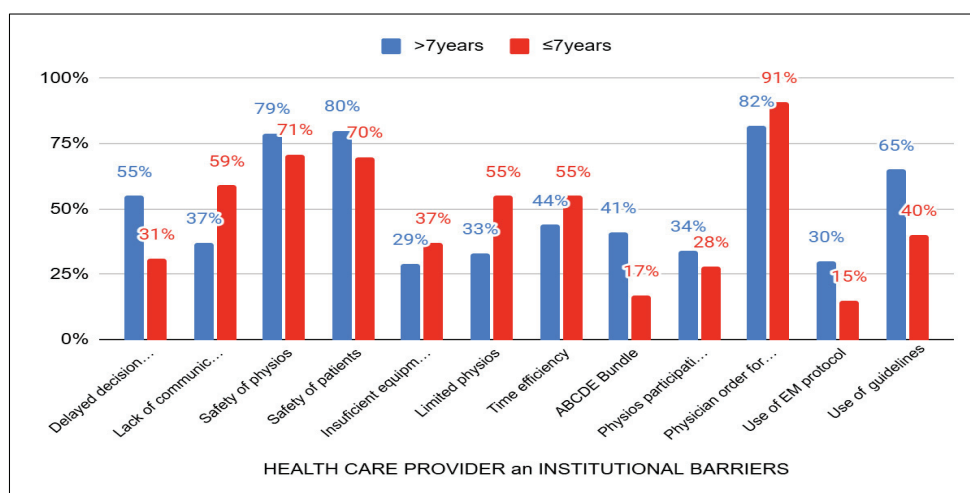


**Figure 5.** Acknowledgement of healthcare provider and institutional-related barriers to years of experience between those with >7 years and ≤7 years.

#### 4. Discussion

This is the first survey in Greece aimed at assessing physiotherapists' knowledge, practices, and perceptions regarding the barriers to early mobilization. This study holds particular significance, as it was conducted after the COVID-19 pandemic, during which many physiotherapists were employed or reassigned to work in the ICU. Most Greek physiotherapists know what EM involves and the safety issues regarding its implementation. Increased knowledge and sufficient experience appear to be responsible for the fact that most Greek physiotherapists identified hemodynamic instability, ventilator incoherence, and the presence of delirium as the most significant barriers to the early mobilization of ICU patients. They also indicated that the endotracheal tube, femoral line, and muscle weakness were no longer considered barriers to implementing EM. Years of experience and work schedule play a significant role in variances noted in practices and perceived barriers. It seems that dedication to working in the ICU could possibly be a solution for overcoming the barriers noted in previous studies.

Our study aligns with other research, particularly regarding the perception of hemodynamic instability as a significant barrier to EM [13–15,23–26]. Additionally, barriers such as sedation and disconnection from devices, particularly the endotracheal tube, have also been reported in other studies [10,12–15,20–22,24–27]. Yet, from our findings, Greek physiotherapists seem confident in mobilizing patients alongside their monitoring equipment and lines, likely due to their experience and training. It is important to note that most of the studies referenced were conducted before 2020, a time when early mobilization was still in its early stages of implementation. Consequently, Greek physiotherapists are now more informed about how to overcome these barriers, as there are published studies outlining strategies to address them. Moreover, it is worth mentioning that the Panhellenic Physiotherapists' Association Section of Cardiovascular and Respiratory Physiotherapy—Rehabilitation often organizes training sessions on ICU physiotherapy and EM. The importance of training in overcoming barriers is well presented in previous related studies [21,25,28–31]. Thus, in a survey conducted by Grammatopoulou et al. (2017), 59.2% of Greek physiotherapists indicated that they had received training to mobilize critically ill patients out of bed [17]. Furthermore, the necessity for protocols and guidelines is recognized by foreign participants as well, with many emphasizing their absence [13–15,20–24,27–30]. This suggests that both Greek and foreign physiotherapists understand the importance of organization and structured procedures. The existence of protocols facilitates effective communication between physiotherapists and ICU staff, contributing to improved time management and coordination of various procedures within the ICU.

Many studies have identified inadequate equipment and a shortage of physiotherapists as significant barriers to implementing EM [13–15,20,21,23–30]. Additionally, musculoskeletal injuries have been linked to a lack of staff and equipment [10,13–15,21,27,31]. The varied responses from Greek physiotherapists can be attributed to individual differences in work schedules and years of experience. Most Greek physiotherapists do not use equipment outside of the rehabilitation department, so they may not recognize its necessity as described in relevant literature [16]. Limited time is a common concern among all participants, which may stem from ambiguous roles and responsibilities that contribute to increased workloads and insufficient time for patient care. It is also worth noting that many studies involved healthcare workers from various specialties. Moreover, foreign physiotherapists highlighted that the lack of instructions and referrals from physicians significantly hinders the process. Conversely, Greek physiotherapists often take the initiative to implement EM independently, probably as a means to save and organize better their time.

When examining differences in work schedules, it is important to consider that most Greek and foreign physiotherapists reported not working exclusively in the ICU. However, those who do work solely in the ICU tend to achieve better patient management and are more successful in overcoming recognized barriers related to EM. In particular, issues of communication and time management are addressed more effectively when healthcare providers spend their entire shift in a specific department. Having dedicated physiotherapists in ICU has been presented as a facilitator to increase EM of ICU patients [21]. Nevertheless, this approach does not resolve the significant staffing shortages that exist in all healthcare systems.

Differences were observed when we examined the role of extensive experience in the ICU. The ICU has unique demands, and physiotherapists in this setting need a range of skills that are often not covered in their basic training. The European Respiratory Society's respiratory physiotherapy task force has developed a new harmonized postgraduate curriculum for training in respiratory physiotherapy. This curriculum builds on the core syllabus for postgraduate training and includes many of the skills necessary for working in the ICU [32]. However, we have noted significant differences that may also be attributed to the fact that a portion of physiotherapists with less than seven years of experience were employed or transferred to work in the ICU during the COVID-19 pandemic. Surprising differences that we noticed in knowledge related to years of experience were not shared by the study of Jolley et al. [21].

The majority of Greek participants expressed that collaboration with ICU staff during EM is feasible. However, they were unclear about whether there is effective communication, coordination, and organization regarding the therapeutic interventions that should be implemented for each patient among the ICU team. This suggests that a common communication framework among staff members is lacking, likely due to the absence of established protocols. In contrast, the foreign participants identified the inability to collaborate among staff as a significant barrier to implementing EM effectively [13–15,20,22,23].

There are some limitations to our survey that should be noted. Firstly, the demographic data indicates that most participants came from urban centers, which means that representation from rural and island areas is limited. Additionally, not all Greek hospitals were included in the survey due to challenges in communication. The questionnaire itself also has a lengthy completion time, which may have discouraged some potential participants or caused them to interrupt the process. The lack of open-ended questions could have deprived the participants from adding other barriers that have not been identified in previous studies. Furthermore, participation in the study requires familiarity with or access to technology. It is also important to note that we were unable to determine an adequate sample size, as the total number of physiotherapists working in Greek ICUs is unknown.

To improve our practices, we need to investigate the effectiveness of proposed strategies to overcome the noted barriers, especially hemodynamic instability and incoherence with the ventilator. Besides dedicated physiotherapists, the incorporation of mobility teams or mobility champions could lead to an increase in the percentage of patients mobilized out of bed. But firstly, we need to have a better picture of this, and a point prevalence study on EM is needed. Additionally, although nurses are not usually involved in EM in Greece, we should thoroughly investigate whether we have a change in attitudes and practices over the years.

## 5. Conclusions

Most Greek physiotherapists believe that early mobilization is crucial for the rehabilitation of critically ill patients. A significant percentage know guidelines, yet they do not follow a specific protocol. Various barriers prevent its implementation, which depends

on the patients, healthcare providers, and the overall process. Yet, it is recognized that practices and perceived barriers are influenced by experience and work schedule. Establishing clinical protocols is essential to facilitate the implementation of early mobilization and support patient rehabilitation. Future efforts should focus on designing strategies and EM protocols for physiotherapy in Greek ICUs. Also, we need to monitor changes in perceived barriers across other countries as focus on the matter via published studies and clinical seminars could lead to significant changes.

**Supplementary Materials:** The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/healthcare13111248/s1>. Table S1: Items measuring Greek physiotherapists' knowledge on EM practice; Table S2: Items that measure practices related to EM in Greek ICUs; Table S3: Items that measure perceptions of Greek physiotherapists regarding EM. Table S4: Items that measure perceived barriers to EM.

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**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The original contributions presented in this study are included in the article/Supplementary Material. Further inquiries can be directed to the corresponding author.

**Conflicts of Interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Article

# Enhancing Patient Safety Through Predictors of Job Performance in Greek Critical Care Nurses

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**Abstract: Background/Objectives:** Job performance among critical care nurses is a pivotal determinant of patient safety. While individual psychosocial factors such as self-care and self-compassion have been separately linked to professional efficacy, limited research has examined their integrated contribution to job performance in high-stakes healthcare environments. **Methods:** A cross-sectional study was conducted in five public hospitals in Northern Greece. A convenience sample of 311 critical care nurses and nurse assistants completed validated self-report measures assessing self-care, self-compassion, mindfulness, physical activity, secondary traumatic stress, and job performance. The data were analyzed using non-parametric statistics and multivariate linear regression. **Results:** Higher levels of self-care ( $p = 0.003$ ) and self-compassion ( $p = 0.042$ ), and lower levels of secondary traumatic stress ( $p = 0.04$ ), were significantly associated with better job performance. The final regression model explained 31% of the variance in performance scores ( $R^2 = 0.31$ ). Mindfulness and physical activity were not significantly associated with job performance. Secondary traumatic stress emerged as the strongest negative predictor. **Conclusions:** Internal psychosocial resources, particularly self-care and self-compassion, significantly contribute to job performance among critical care nursing personnel. These findings underscore the relevance of embedding staff well-being strategies into organizational patient safety agendas. This multidimensional model provides a novel framework for developing targeted interventions in high-acuity healthcare settings.

**Keywords:** patient safety; critical care; nurses; job performance; psychosocial factors

## 1. Introduction

Ensuring patient safety in critical care settings remains a top global priority, especially given the high demands, complex interventions, and emotional toll of intensive care environments. Among the various systemic and clinical strategies proposed, an emerging body of research highlights the central role of frontline healthcare professionals' well-being in preventing errors and promoting optimal outcomes [1,2]. Despite this, studies specifically targeting predictors of job performance among critical care nurses and their indirect impact on patient safety are still limited.

Patient safety is a structured system of organized activities that fosters cultures, processes, procedures, behaviors, technologies, and environments in healthcare, aimed at

continuously and sustainably mitigating risks, decreasing the incidence of preventable damage, minimizing the likelihood of errors, and lessening the effect of harm when it occurs [3]. Patient safety is paramount in critical care settings, such as Intensive Care Units (ICUs) and Emergency Departments (ERs), due to critically ill patients' medical status, acuity, and vulnerability [4]. Rapid decision making and the need for life-sustaining interventions elevate the potential for clinical errors, which remain one of the most serious threats to patient safety in critical care settings [5].

Increased incidences of clinical mistakes, particularly in high-pressure environments, have been directly linked to factors such as burnout [6], fatigue [7], and poor mental health among nurses [8]. These factors collectively contribute to the degradation of their performance, thereby jeopardizing patient safety. However, several protective psychosocial and behavioral factors have been acknowledged to enhance the performance of nurses, thus contributing significantly to nurses' ability to make sound clinical decisions. Emotional resilience, mindfulness, physical self-care, and psychological safety are recognized as foundational competencies that influence both care quality and safety cultures [9].

Emotional intelligence (EI) is defined as "the ability to perceive and manage emotions of oneself and others" [10]. It is essential for stress management, enhancing well-being, maintaining composure during emergencies, and improving clinical decision-making, which reduces the likelihood of errors [11]. Studies have shown that high levels of EI among nurses are associated with improved clinical competence and clinical judgement [12], more effective interaction with patients [13], and enhanced cooperation in multidisciplinary teams [14]. These qualities foster a safety culture by promoting clear communication and early identification of potential risks, thus ensuring the safety of care delivery.

Mindfulness is another protective factor that enhances nurses' focus, reduces cognitive errors, and supports emotional regulation in high-stress environments [15]. Mindfulness is the ability to remain fully present and aware of one's thoughts, emotions, and surroundings nonjudgmentally and without criticism [16]. Research suggests that mindful nurses are more attentive to their patients [17] and are more likely to adhere to safety protocols, resulting in a higher level of patient safety [18].

For nurses working in high-intensity environments such as critical care units, self-compassion is recognized as a vital psychological resource. It refers to being supportive, understanding, and kind toward oneself during times of failure, inadequacy, or personal suffering [19]. Self-compassion can buffer the adverse effects of stress and mitigate the harsh self-criticism that has been shown to impair cognitive function and decision-making, both of which are important for maintaining patient safety [20]. Research indicates that nurses who practice self-compassion are more likely to acknowledge clinical mistakes without fear, learn from them, and ultimately improve patient safety [21].

Secondary traumatic stress is often described as emotional and physical exhaustion resulting from prolonged exposure to patient suffering [22]. When it occurs, nurses may display reduced empathy towards patients, emotional numbness, and decreased job satisfaction [23]. This limited emotional engagement can impair clinical judgement and increase the possibility of errors [24]. Studies show that secondary traumatic stress affects the quality of nursing care and is strongly associated with reduced adherence to safety protocols [25,26].

The role of physical activity as a key factor in supporting the health, cognitive function, and overall well-being of nurses, which are factors that indirectly influence nurses' ability to remain alert and make sound clinical decisions, thus enhancing the maintenance of patient safety, has been suggested by various research [27–29]. Physically active nurses also report lower burnout and fatigue, which contribute to errors and reduced mental clarity and safety [30,31].

Finally, nurses' self-care is recognized as essential in promoting patient safety. Engaging in self-care helps nurses create a healing environment that alleviates the risks of burnout and secondary traumatic stress while enhancing patient satisfaction [32,33]. In addition, self-care supports better decision-making by enabling nurses to respond more effectively to high-pressure situations and patients' complex needs [34].

Given critical care nurses' well-documented challenges—including emotional exhaustion, secondary traumatic stress, and cognitive overload—there is a growing interest in identifying protective personal factors that may enhance professional functioning and contribute to safer care delivery. While previous studies have explored elements such as mindfulness, resilience, or burnout in isolation, few have examined their combined predictive value in the context of job performance. The present study aimed to investigate the extent to which individual-level psychosocial and behavioral factors—such as self-care, self-compassion, physical activity, mindfulness, and secondary traumatic stress—predict job performance among Greek nursing personnel in critical care settings.

To our knowledge, this is the first study to simultaneously investigate the roles of all these factors within an integrated predictive model of job performance in critical care nursing staff. This multidimensional approach provides a novel perspective on how individual-level resources may buffer the demands of high-intensity healthcare environments and support institutional patient safety goals. By examining these predictors within the high-stakes environment of ICUs and ERs, the study aimed to elucidate their indirect yet pivotal role in enhancing patient safety, recognizing that optimal nurse performance is a cornerstone of error prevention, clinical responsiveness, and high-reliability care delivery. The purpose of this study was to investigate the relationship between self-care, self-compassion, secondary traumatic stress, mindfulness, and physical activity, and their predictive value for job performance among ICU and ER nursing personnel. We hypothesized that higher levels of self-care, self-compassion, mindfulness, and physical activity, and lower levels of secondary traumatic stress, would be significantly associated with better job performance.

## 2. Materials and Methods

### 2.1. Study Design and Setting

A cross-sectional descriptive study was conducted in critical care settings (ICU and ER) of 5 secondary and tertiary public hospitals in Northern Greece between September 2024 and December 2024. The study's description was disseminated to potential participants via multiple channels, including informational flyers and posts placed in high-traffic areas of hospitals, such as break rooms, elevators, notice boards, and staff portals. Participation was entirely voluntary, and no incentives were offered. To ensure that participation was free from undue influence, especially from supervisors or hospital administrators, the recruitment process was conducted independently by the research team and no managerial staff were involved in recruitment. Interested personnel contacted the first author and received further information about the study. After providing participants with an overview of the research procedures, participants received the study link.

### 2.2. Data Collection

A convenience sample of nursing personnel working in critical care settings was considered eligible for the study. The study targeted nurses who met the following criteria: nurses who had permanent employment status, at least one year of working experience, and involvement in direct care of patients in the ICU and ER departments. Nursing personnel in non-clinical roles, such as administrative staff and supervisors, were excluded

from participation. Data were collected using a self-administered questionnaire distributed through Google Forms. Completion time was approximately 10–15 min.

### *2.3. Ethical Considerations*

The study was conducted according to the Declaration of Helsinki, and the protocol was approved by the scientific committee of all the hospitals involved. At all stages of the study, participants were informed that their involvement was voluntary and anonymous and that they could withdraw at any time without consequence.

### *2.4. Data Collection Tools*

A structured questionnaire was used with the following: (a) demographic and occupational characteristics, (b) the Self-Care Scale, (c) the Self-compassion scale (SCS), (d) the International Physical Activity Questionnaire (IPAQ), (e) the Mindful Attention and Awareness Scale (MAAS), (f) the Secondary Traumatic Stress subscale (STS) of The Professional Quality of Life Scale (ProQuol), and (g) the Job Performance Scale (JPS).

### *2.5. Demographic and Occupational Characteristics*

The demographic and occupational characteristics questionnaire was constructed for the study. It included the following questions: gender, age, marital status, level of education, years of experience, and working department.

### *2.6. The Self-Care Scale*

The Self-Care Scale was developed based on existing literature [35,36] and includes 35 items designed to assess the self-care practices of individuals. This scale has previously been utilized in healthcare professionals (HPs) in Greece [37] and demonstrated excellent internal consistency (Cronbach's  $\alpha > 0.90$ ). The response options ranged from 1 (never) to 6 (always), with higher scores reflecting higher levels of self-care. The total score on the self-care scale ranges from 35 to 210. The Cronbach's alpha internal consistency for the study was 0.926, indicating an excellent level of reliability.

### *2.7. The Self-Compassion Scale*

The Self-Compassion Scale (SCS) examines the relationship between self-compassion, positive psychological health, and the Five-Factor Model of Personality [38]. Self-compassion involves being kind to oneself in times of pain or failure, perceiving one's experiences as part of a larger human experience, and keeping painful thoughts and feelings in balance. The SCS consists of 26 items that are rated on a 5-point Likert scale, ranging from "Rarely (1)" to "Almost Always (5)", with the total score calculated as the mean of the responses. Scores on the scale from 1 to 2.5 indicate low self-compassion, 2.5 to 3.5 indicate moderate self-compassion, and 3.5 to 5.0 indicate high self-compassion [38]. The SCS has been translated into Greek, and it is an effective tool for measuring self-compassion within the Greek cultural context, with adequate psychometric properties [39]. The Cronbach's  $\alpha$  for the study was 0.866, indicating good reliability.

### *2.8. The International Physical Activity Questionnaire*

The International Physical Activity Questionnaire (IPAQ) [40] is a widely used tool for assessing participants' physical activity (PA). The original version consists of 31 questions, while the short form includes 7. Participants are asked to record the frequency and duration of their involvement in activities of varying intensity over the past seven days. The IPAQ calculates PA in terms of MET-minutes·week<sup>1</sup> for walking, moderate-intensity, and vigorous-intensity activities. The Metabolic Equivalent of Task (MET) represents the ratio of the work metabolic rate to the resting metabolic rate [41]. Based on the total MET-

minutes·week<sup>1</sup>, PA levels are categorized as low (Total PA score < 600 MET-min·week<sup>−1</sup>), moderate (Vigorous PA score ≥ 480 MET-min·week<sup>−1</sup> or Total PA score ≥ 600 MET-min·week<sup>−1</sup>), or high (Vigorous PA score ≥ 1500 MET-min·week<sup>−1</sup> or Total PA score ≥ 3000 MET-min·week<sup>−1</sup>). The IPAQ has been validated for the Greek population [42].

### 2.9. The Mindful Attention Awareness Scale

The Mindful Attention Awareness Scale (MAAS) [43] consists of 15 questions that measure an individual's tendency to operate on “autopilot”, without focusing attention on the present experience. Responses are given on a 6-point Likert scale, ranging from “Almost Always (1)” to “Rarely (6)”. According to the authors, the scale does not include other elements of mindfulness, such as non-judgmental behavior, as awareness and attention to the present moment are considered the most fundamental components of this concept. The scale has been validated in Greek in a student sample [39]. The Cronbach's  $\alpha$  for the study was 0.894, indicating good reliability.

### 2.10. The Secondary Traumatic Stress Scale

The Secondary traumatic stress Scale from the Professional Quality of Life Scale (ProQoL) [44] assessed secondary traumatic stress. The Secondary traumatic stress Scale consists of 10 items evaluating compassion fatigue/secondary traumatic stress, and responses are rated on a 6-point Likert scale ranging from “Never (1)” to “Very Often” (6) [44]. The ProQOL questionnaire has been translated and validated in Greek and has been used in Greek nurses [45]. The Cronbach's  $\alpha$  for the study was 0.759, indicating acceptable reliability.

### 2.11. The Job Performance Scale

The Job Performance Scale (JPS) (adapted from Goodman and Svyantek's scale) [46] consists of 6 statements: three statements assess in-role performance (e.g., the statement “You meet performance criteria”), while the remaining three statements evaluate extra-role performance (e.g., “You willingly take on tasks that are not part of your duties but are beneficial to the overall image of the organization”). Participants' responses are rated on a Likert scale ranging from “Does not describe me at all (0)” to “Describes me perfectly (6)”. It has been adapted into Greek [47], and the Cronbach's  $\alpha$  for the overall study's instrument was 0.885, indicating good reliability.

### 2.12. Data Analysis

Data analyses used the Statistical Package for Social Sciences, version 26 (Armonk, NY, USA, IBM Corporation). The normality of the distribution of observed numeric variables was assessed using the Kolmogorov–Smirnov test. Categorical variables are presented as numbers and percentages, while continuous variables are expressed as mean  $\pm$  standard deviation. Since the regularity check showed no normal distribution of variables, non-parametric methods were conducted. Differences in job performance based on gender, marital status, level of education, and working department were examined using the Mann–Whitney Z-test and the Kruskal–Wallis H-test. Spearman's correlation coefficient was performed between all other independent variables and job performance. Variables showing a significant association with job performance in the bivariate analysis were entered into a multiple regression model as predictors, with job performance as the dependent variable.

## 3. Results

A total of 311 questionnaires were received. The respondents included 219 (70.4%) nurses and 92 (29.6%) nurse assistants. The sample consisted mainly of females (72.3%),

who lived with their family (60.8%) and worked in the ICU (59.2%). The demographic and occupational characteristics of the participants are presented in Table 1.

**Table 1.** Demographic and occupational characteristics.

| Variables                       | n (%)       |
|---------------------------------|-------------|
| Gender                          |             |
| <i>Female</i>                   | 225 (72.3)  |
| <i>Male</i>                     | 86 (27.7)   |
| Age <sup>a</sup>                | 46.23 (7.4) |
| Marital status                  |             |
| <i>Live with my partner</i>     | 83 (26.7)   |
| <i>Live alone</i>               | 39 (12.5)   |
| <i>Live with my family</i>      | 189 (60.8)  |
| Nursing personnel               |             |
| <i>Nurses</i>                   | 219 (70.4)  |
| <i>Nurse assistants</i>         | 92 (29.6)   |
| Working experience <sup>a</sup> | 17.4 (9)    |
| Department                      |             |
| <i>ICU</i>                      | 184 (59.2)  |
| <i>ER</i>                       | 127 (40.8)  |

<sup>a</sup> Mean (SD).

The descriptive statistics for the six scales (Self-care, IPAQ, SCS, MAAS, CFS, and JP) are presented in Table 2. The mean score for the Self-care scale was 140.6 ( $\pm 25.76$ ), indicating a high level of self-care. The mean score for the MAAS was 4.22 ( $\pm 0.82$ ) above the mid-point, suggesting a high level of mindfulness, while the mean score for the SCS was 2.95 ( $\pm 0.54$ ), indicating moderate self-compassion. The mean score for the CFS was 24.24 ( $\pm 5.68$ ), indicating (total score on the CFS ranges from 10 to 60) low levels of secondary traumatic stress. The nursing personnel's total PA was 1592.9 ( $\pm 743.8$ )  $\text{met}\cdot\text{min}\cdot\text{wk}^{-1}$ , indicating a moderate PA profile classification (PA class  $1.78 \pm 0.7$ ).

**Table 2.** Descriptive statistics for Self-care scale, SCS, MAAS, CFS, JP, and IPAQ.

| Scale                                              | Mean   | Standard Deviation |
|----------------------------------------------------|--------|--------------------|
| Self-care scale                                    | 140.6  | 25.76              |
| SCS                                                | 2.95   | 0.54               |
| MAAS                                               | 4.22   | 0.82               |
| CFS                                                | 24.24  | 5.68               |
| JP total                                           | 27.53  | 5.90               |
| In-role performance                                | 13.61  | 3.14               |
| Extra-role performance                             | 13.91  | 3.20               |
| IPAQ total                                         | 1592.9 | 743.8              |
| ( $\text{MET}\cdot\text{min}\cdot\text{wk}^{-1}$ ) |        |                    |
| PA Classification                                  | 1.78   | 0.7                |

The bivariate analysis between the independent variables and JP is shown in Table 3. There was a significant difference between JP and gender (female mean = 45.23 and male mean = 53.76) ( $p = 0.002$ ), greater age ( $\rho = 0.558$ ,  $p = 0.041$ ), nursing personnel (nurses mean = 49.23 and nurse assistants mean = 45.36), and greater working experience ( $\rho = 0.419$ ,  $p = 0.021$ ). Moreover, there was a positive association between JP and the level of self-care (higher) ( $p = 0.018$ ) and self-compassion (higher) ( $p = 0.014$ ), while there was a negative association with secondary traumatic stress ( $p = 0.028$ ).

**Table 3.** Summary table of correlations between independent variables and JP.

| Independent Variable | Test Used         | Test Statistic (Z/H/ $\rho$ ) | JP <i>p</i> -Value |
|----------------------|-------------------|-------------------------------|--------------------|
| Gender               | Mann–Whitney U    | 1.860                         | 0.002 *            |
| Age                  | Spearman's $\rho$ | 0.558                         | 0.041 *            |
| Living arrangement   | Kruskal–Wallis H  | 0.925                         | 0.630              |
| Nursing personnel    | Mann–Whitney U    | 1.142                         | 0.025 *            |
| Working experience   | Spearman's $\rho$ | 0.419                         | 0.021 *            |
| Department           | Mann–Whitney U    | −0.459                        | 0.145              |
| Self-care Scale      | Spearman's $\rho$ | 0.479                         | 0.018 *            |
| SCS                  | Spearman's $\rho$ | 0.569                         | 0.014 *            |
| MAAS                 | Spearman's $\rho$ | 0.581                         | 0.275              |
| CFS                  | Spearman's $\rho$ | −0.474                        | 0.028 *            |
| IPAQ-total           | Spearman's $\rho$ | 0.623                         | 0.451              |

\* Significant at  $p < 0.05$  level.

The multivariate linear regression showed that the educational level of nursing personnel, self-care, self-compassion, and lower levels of secondary traumatic stress were significant predictors of higher job performance. Secondary traumatic stress emerged as the strongest predictor. The model was statistically significant ( $F = 3.873$ ,  $p = 0.019$ ,  $R^2 = 0.31$ , adjusted  $R^2 = 0.26$ ), explaining 31% of the variance in job performance. Multicollinearity was assessed using variance inflation factors (VIFs), with all values ranging between 1.12 and 1.89, indicating no serious multicollinearity among predictors. Residual analysis, including a visual inspection of Q-Q plots and residual vs. fitted value plots, confirmed the approximate normality and homoscedasticity of the residuals, suggesting that the assumptions of linear regression were met. Variables such as mindfulness and physical activity (IPAQ) were excluded from the regression model due to their non-significant associations with job performance in the bivariate analysis. These findings are presented in Table 4.

**Table 4.** Summary of multiple regression model with job performance as dependent variable.

| Variables                              | B      | Standard Error | <i>t</i> | <i>p</i> | 95% CI        |
|----------------------------------------|--------|----------------|----------|----------|---------------|
| Gender                                 | −0.036 | 0.772          | 0.047    | 0.963    | −1.547, 1.481 |
| Age                                    | 0.057  | 0.061          | 0.932    | 0.352    | −0.063, 0.177 |
| Educational level of nursing personnel | 0.642  | 0.306          | 2.10     | 0.038 *  | 0.042, 1.242  |
| Working experience                     | 0.002  | 0.051          | 0.046    | 0.963    | −0.103, 0.098 |
| Self-care Scale                        | 0.152  | 0.048          | 0.58     | 0.003 *  | 0.130, 0.181  |
| SCS                                    | 0.132  | 0.033          | 2.717    | 0.042 *  | 0.063, 0.203  |
| CFS                                    | −0.081 | 0.042          | 2.856    | 0.04 *   | −0.164, 0.003 |

 $F = 3.873$ ,  $p = 0.019$ ,  $R^2 = 0.31$ , \*  $p < 0.05$ .

#### 4. Discussion

This study investigated the influence of individual-level psychosocial and behavioral factors—namely self-care, self-compassion, physical activity, mindfulness, and secondary traumatic stress—on job performance among nurses and nurse assistants in critical care settings. The results revealed that higher levels of self-care and self-compassion, alongside lower levels of secondary traumatic stress, were significant predictors of improved job performance. These findings align with emerging healthcare models that view staff well-being not as peripheral, but as central to patient safety and high-reliability care systems [48–50].

Self-care emerged as a significant positive predictor of job performance. Previous studies have highlighted that nurses who actively engage in self-care practices report higher professional satisfaction, better psychological well-being, and reduced burnout—all contributing to improved performance and safer clinical practices [51,52]. Moreover, self-care practices have been associated with enhanced resilience and coping mechanisms, which are essential in high-stress environments like critical care units [24,52].

Similarly, self-compassion significantly contributed to job performance. Nurses with higher self-compassion tend to exhibit greater emotional regulation and psychological resilience, mitigating the impact of workplace stress and secondary traumatic stress [53]. One plausible explanation for the beneficial effect of self-compassion on job performance lies in its role as a self-regulatory mechanism. Self-compassionate individuals are more likely to engage in adaptive emotion regulation strategies, such as cognitive reappraisal and self-soothing, which enable them to recover more effectively from clinical errors or emotionally challenging patient interactions [54]. This emotional flexibility may help preserve mental bandwidth for task-focused behavior, enhance interpersonal communication, and reduce avoidance-based coping, which are essential factors in maintaining high-quality performance in critical care environments. Moreover, self-compassion has been associated with lower levels of rumination and self-criticism, which could otherwise impair decision-making accuracy and attentional control in high-stakes settings [24,55].

Our findings revealed that higher levels of self-care and self-compassion, along with lower levels of secondary traumatic stress, were significantly associated with better job performance ( $p < 0.05$ ), which is in turn a documented protective factor against clinical errors [46,56]. These findings align with global research trends among critical care nurses. For instance, in a mixed-methods study design in acute medical care hospital nurses, the use of self-compassion as a coping strategy was reported as beneficial for the caregiver, with corresponding benefits for the patient needing care [57]. Also, in a cross-sectional study in Turkey, nurses reported moderate levels of self-compassion, which significantly predicted caring behavior [58]. Given that enhanced nurse performance correlates directly with safer patient care and reduced adverse events [59,60], our results underscore the necessity of supporting personal wellness strategies in critical care professionals as a core patient safety intervention.

However, in contrast, secondary traumatic stress was negatively associated with job performance, echoing findings from past research highlighting its adverse impact on concentration, clinical decision-making, and interpersonal functioning [49,61]. Elevated levels of secondary trauma and secondary traumatic stress are known to impair recognition of subtle clinical cues, increase irritability, and promote disengagement from patients, representing factors that are all detrimental to patient safety [61,62].

Although mindfulness was not statistically significant in the multivariate model, prior studies have documented its positive effects on nurse well-being and professional efficacy. Mindfulness-based interventions (MBIs) have been shown to reduce burnout, enhance compassion satisfaction, and foster attentional control, which are particularly valuable traits in the cognitively demanding context of critical care [55,63]. Likewise, regular physical activity has been associated with decreased stress and improved emotional regulation among nurses [52,64]. However, contrary to previous studies that reported significant associations between physical activity through self-care and improved job performance [51,52,65], the present study did not identify a statistically significant relationship between IPAQ scores and performance indicators. The absence of a significant association between physical activity and job performance in this study may be explained by several contextual and methodological factors. First, the relatively low variability in the IPAQ scores—predominantly in the low-to-moderate activity range—may have limited the ability

to detect meaningful effects. Second, systemic constraints in the Greek public healthcare setting, including irregular shift patterns, staffing shortages, and insufficient institutional support for wellness initiatives, may reduce the feasibility and impact of sustained physical activity among nursing staff. Furthermore, it is plausible that any beneficial effects of physical activity on work performance are indirectly mediated through mechanisms such as improved sleep quality, emotional regulation, or reduced fatigue—variables not directly captured in the current model. In terms of model specification, both mindfulness and physical activity were excluded from the final regression due to their non-significant associations with job performance in the bivariate analysis. It is also possible that collinearity with variables such as self-care or self-compassion influenced their predictive ability. These considerations underscore the importance of future research aimed at disentangling the complex pathways through which physical activity may contribute to professional functioning in high-stress clinical environments.

All the above findings underscore the importance of integrating psychological wellness into institutional patient safety strategies. The safety of critically ill patients depends on adherence to clinical guidelines and the cognitive, emotional, and physical functioning of the nurses delivering care [48,52]. Embedding structured wellness programs—including self-care workshops, mindfulness training, and trauma-informed peer support—into continuing professional development may contribute significantly to a safer care environment [51].

This study has some limitations. Its cross-sectional design precludes causal inferences. The reliance on self-reported measures raises the possibility of response bias due to social desirability. The number of nurses who declined to participate and the total number of employed nurses during the study period were not recorded. This limits our ability to determine the response rate and assess the representativeness of the sample. Also, an *a priori* power analysis was not conducted to determine the required sample size, which limits our ability to assess whether the study was adequately powered to detect small-to-moderate effects. Additionally, the exclusion of mindfulness and physical activity from the regression model—despite theoretical relevance—represents a methodological limitation. These variables were omitted due to their non-significant bivariate associations with job performance and potential conceptual overlap with the included predictors. Furthermore, the sample was geographically limited to hospitals in Northern Greece, which may limit its generalizability to other regions or healthcare systems. Despite these limitations, the study has several methodological strengths. It employed validated and widely used instruments to measure key psychosocial variables, enhancing the reliability and comparability of results. Additionally, the sample size was adequate for multivariate analyses and included participants from multiple hospitals, improving the ecological validity of the findings within critical settings. Nonetheless, the study provides valuable insights into modifiable predictors of job performance, with practical implications for workforce development and patient safety initiatives. Although the sample was contextually situated in the Greek healthcare system, the combination of individual-level variables examined has not been widely investigated in an integrated manner in the international literature. This multidimensional approach offers a novel perspective that can inform future research and policy across diverse healthcare contexts, especially as these psychosocial constructs are considered universally relevant to nursing performance and resilience in critical care settings.

However, we acknowledge that institutional structures, staffing models, and cultural norms regarding mental health and self-care vary significantly across countries. These differences may influence both the expression of these psychosocial factors and their impact on job performance. As such, the generalizability of our findings to other healthcare systems should be approached with caution. Replication studies in other national and institutional contexts are needed to assess the robustness of these associations across settings.

Future research should explore longitudinal or intervention-based designs to evaluate causal pathways between staff wellness and patient safety indicators, such as adverse event rates or error reporting frequency. Examining the moderating role of organizational culture, leadership style, and team cohesion may offer a more comprehensive understanding of the mechanisms linking individual well-being to patient outcomes in critical care.

Given the established link between self-compassion, self-care, and job performance, hospital leadership and policymakers should consider integrating structured psychosocial support into staff development programs. Interventions such as self-compassion training, resilience workshops, and trauma-informed supervision may not only enhance staff well-being but also serve as proactive strategies for minimizing latent threats to patient safety [53,66]. Embedding such initiatives into continuing education curricula and accreditation standards could institutionalize a culture of emotional competence, clinical vigilance, and safer care delivery in critical care settings.

## 5. Conclusions

The present study points to the relevance of internal psychosocial resources in sustaining nursing performance within critical care environments. In line with our hypothesis, self-care and self-compassion emerged as significant positive predictors of job performance, while secondary traumatic stress was a significant negative predictor. These findings underscore the importance of internal psychological resources in maintaining optimal functioning under the demanding conditions of ICU and ER settings. Although mindfulness and physical activity were not significant in the final model, their known indirect benefits suggest value for future exploitation. Beyond identifying key associations, this study calls attention to the systemic value of embedding well-being-oriented frameworks into patient safety agendas. Supporting frontline professionals through tailored organizational interventions and integration of self-compassion training in continuing education programs may serve as a workforce resilience strategy and a pathway to safer clinical care. This multidimensional model offers a valuable blueprint for designing integrated workforce development and patient safety strategies in high-acuity healthcare settings.

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## Abbreviations

The following abbreviations are used in this manuscript:

|         |                                               |
|---------|-----------------------------------------------|
| ICU     | Intensive Care Unit                           |
| ER      | Emergency Department                          |
| SCS     | Self-Compassion Scale                         |
| IPAQ    | International Physical Activity Questionnaire |
| MAAS    | Mindful Attention and Awareness Scale         |
| STS     | Secondary Traumatic Stress                    |
| ProQuol | Professional Quality of Life Scale            |
| JPS     | Job Performance Scale                         |
| PA      | Physical Activity                             |

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## Article

# Frequency, Grades of Toxicity, and Predictors of Hepatotoxicity and Acute Kidney Injury with Remdesivir in COVID-19 Patients: A Multicenter Retrospective Cohort Study

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## Abstract

**Background:** Remdesivir is associated with hepatotoxicity and acute kidney injury (AKI). The objective of this study was to assess the hepatotoxicity and AKI with remdesivir. **Method:** This is a multicenter, retrospective cohort study for adult patients who used remdesivir for COVID-19 from 3/2020 to 10/2021. The study was conducted at Rhode Island Hospital, Rhode Island, United States. Data were analyzed with descriptive statistics as well as logistic regression analysis using STATA 18. **Results:** A total of 1635 patients were evaluated for hepatotoxicity: 337 developed hepatotoxicity, and 1298 had normal hepatic function. The overall median frequency of hepatotoxicity occurred in 319 patients (19.5%). Patient age (OR 1.02, 95% CI: 1–1.04,  $p = 0.02$ ) and selective serotonin reuptake inhibitors (SSRIs) use (OR 1.7, 95% CI: 1.1–2.6,  $p = 0.01$ ) were potential risk factors for remdesivir-associated hepatotoxicity. In contrast, being male gender was protective against remdesivir-associated hepatotoxicity (OR 0.63, 95% CI: 0.47–0.87,  $p = 0.02$ ). The frequency of AKI with remdesivir occurred in 280 patients (17.3%). **Conclusions:** The frequency of hepatotoxicity was 19.5%, and the frequency of AKI was 17.3%. Increasing age and using SSRIs were risk factors for remdesivir-associated hepatotoxicity, while male gender was a protective factor. Clinicians should vigilantly monitor hepatic and renal functions for patients using remdesivir, especially in elderly patients.

**Keywords:** remdesivir; hepatotoxicity; acute kidney injury; liver; COVID-19

## 1. Introduction

The coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been a global health challenge since its emergence in 2019 [1]. Although the burden of severe illness has declined due to widespread vaccination, natural immunity, and evolving viral variants, COVID-19 remains an ongoing concern as of 2025. Healthcare systems worldwide continue to manage new cases, particularly among vulnerable populations, and the need for effective antiviral therapies remains critical to improve patient outcomes [2].

Remdesivir, a viral RNA-dependent RNA polymerase inhibitor, demonstrated in vitro activity against SARS-CoV-1 [3]. Due to its antiviral potential, it was quickly recognized as a promising treatment option for COVID-19 due to its ability to inhibit SARS-CoV-2 replication in laboratory studies [3,4]. Based on multiple clinical trials, the U.S. Food and Drug Administration (FDA) approved remdesivir in October 2020 for the treatment of COVID-19 in hospitalized adults and pediatric patients aged 12 years or older who weigh at least 40 kg [5]. The recommended dosage is 200 mg intravenously (IV) on day 1, followed by 100 mg IV daily for 5 to 10 days. It has also been incorporated in the National Institutes of Health (NIH) COVID-19 management guidelines [6].

In clinical settings, concerns remain regarding the safety of remdesivir, particularly in critically ill patients [5,7]. Commonly reported adverse effects include nausea, vomiting, bradycardia, elevated liver enzymes, and AKI, with some studies highlighting a higher prevalence of AKI among older adults with comorbidities. While several investigations showed favorable clinical outcomes, the overall safety and efficacy profile of remdesivir remains mixed and continues to warrant close monitoring and further study [8]. Additionally, a clinical study assessing patients with creatinine clearance (CrCl) <30 mL/min found that the risk of AKI at the end of treatment is present regardless of the baseline CrCl [9,10]. A study by Kim et al. evaluated the hepatobiliary ADR associated with remdesivir; however, it has a limitation in that it did not evaluate the risk factors of hepatotoxicity [11]. Moreover, Li et al. evaluated AKI with remdesivir in COVID-19 patients and found a risk of AKI with remdesivir, but they did not evaluate the grades of AKI [12].

The exact mechanisms by which remdesivir induces liver or kidney injury remain unclear and are difficult to study [13]. However, kidney injury is believed to be related to the accumulation of its solubility enhancer, sulfobutylether  $\beta$ -cyclodextrin sodium (SBECD), in the renal system. In contrast, liver injury is more likely due to direct hepatocellular toxicity caused by remdesivir's inhibition of mitochondrial RNA polymerase [14]. As a prodrug, remdesivir is metabolized by CYP3A4 and transported by P-glycoprotein, both of which are subject to drug interactions that may increase remdesivir plasma levels. It is worth mentioning that SSRI use was associated with a higher frequency of liver injury, which could be related to their effect on increasing remdesivir plasma levels. Additionally, remdesivir inhibits carboxylesterase-2, an enzyme involved in the metabolism of various drugs and toxins, potentially contributing to increased hepatotoxicity.

Liver injury associated with remdesivir typically presents as elevated AST, ALT, and serum bilirubin or alkaline phosphatase levels, and these abnormalities usually resolve upon drug discontinuation [14,15]. It is also important to consider that renal and hepatic injuries may be partly attributable to the inflammatory response associated with COVID-19 or the effects of other concurrently administered therapies, rather than remdesivir alone [16].

Currently published studies have limitations, including small sample sizes, failure to evaluate the grades of toxicities, or failure to assess potential risk factors. Therefore, the objective of this study is to assess the frequency, grades of toxicity, and risk factors for hepatotoxicity and AKI associated with remdesivir in patients hospitalized with COVID-19.

## 2. Materials and Methods

### 2.1. Study Design and Setting

This is a multicenter, retrospective cohort study for patients who used remdesivir (Gilead, Foster City, CA, USA) for COVID-19 from March 2020 to October 2021. The study was conducted at Rhode Island Hospital and the Miriam Hospital in Providence, RI, USA.

### 2.2. Included and Excluded Patients

Adult patients ( $\geq 18$  years old) who were diagnosed with COVID-19 by the SARS-CoV-2 test and received remdesivir. The remdesivir was administered by a loading dose of 200 mg intravenously on the first day, followed by 100 mg daily by an intravenous route for up to 10 days of treatment based on the physician's judgment. The timing of toxicity will be considered from the first day of remdesivir administration until 24 h after the last dose of remdesivir to account for remdesivir and its active metabolites [17]. Patients with normal and abnormal baseline hepatic and renal impairment will be included based on the definition below in Section 2.7. Patients with missing hepatic and renal laboratory data will be excluded.

### 2.3. Outcomes

The primary outcome was the frequency of hepatotoxicity and nephrotoxicity. Secondary outcomes were grades of hepatotoxicity and nephrotoxicity, and risk factors for hepatotoxicity. Notably, outcome thresholds for hepatotoxicity were based on Common Terminology Criteria for Adverse Events (CTCAE), version 5 [18]; outcomes for nephrotoxicity were based on the CACTE and the KDIGO guideline, 2012 [18,19].

### 2.4. Data Collection

The data for each patient was extracted from the Electronic Health Record and exported as an Excel sheet for statistical analysis. The following data were obtained: patients' demographic information, laboratory results, vital readings, disease comorbidities, and treatment settings.

### 2.5. Statistical Analysis

Patients' baseline results were obtained as mean with standard deviation or median with interquartile range and analyzed with the Student's *t*-test and the Mann-Whitney-Wilcoxon test, respectively. Categorical variables were analyzed with Pearson's chi-square test.

We estimated the frequency of hepatotoxicity based on the median percentage for hepatic biomarker enzyme elevation of aspartate aminotransferase (AST), alanine aminotransferase (ALT), and bilirubin.

Risk factors were analyzed using univariate and multivariate logistic regression with the adjustment of known confounders. We selected covariates for multivariate logistic regression based on diseases, laboratory abnormalities, and hepatotoxic and nephrotoxic drugs based on disease pathophysiology and published studies. Specifically, age, gender, race, drugs associated with hepatotoxicity, diabetes, hypertension, and baseline liver function tests. A statistically significant test was determined at a *p*-value threshold of 0.05. Statistical analysis was performed using Stata, version 18 (Stata Corporation, College Station, TX, USA).

### 2.6. Power Calculation for Sample Size

The sample was estimated based on a two-tailed test with an effect size of 10%, a probability of error (*alpha*) of 5%, and a power of 95%. The test yielded a minimum sample

size of 1289 patients with a critical t value of 1.96. Notably, the effect size is estimated based on the literature with estimates approximately ranging from 10% [11]. The power calculation was performed using G\*Power software version 3.1 (©2025 Heinrich-Heine-Universität Düsseldorf).

2.7. Definitions

- Hepatotoxicity: elevation of AST or ALT more than 3 times the upper limit of normal if the baseline was normal, or 1.5–3.0× if the baseline was abnormal; elevation of bilirubin more than 1.5× the upper limit of normal if the baseline was normal, or more than 1.0–1.5× if the baseline was abnormal [18].
- Acute kidney injury: Increase in serum creatinine (Scr) by ≥0.3 mg/dL (≥26.5 μmol/L) within 48 h; or increase in SCr to ≥1.5 times baseline occurring within 7 days; or Urine volume of <0.5 mL/kg/h for 6 h [19].
- Grade 1 toxicity: Asymptomatic or mild symptoms without the need for intervention [18].
- Grade 2 toxicity: Moderate symptoms that need local or noninvasive intervention [18].
- Grade 3 toxicity: Severe or significant but not life-threatening, which warrants hospitalization or prolongation of the hospitalization course [18].
- Grade 4 toxicity: Results in life-threatening implications that warrant urgent intervention [18].
- Grade 5 toxicity: death related to the adverse drug reaction (ADR) [18].

3. Results

Overall, 1635 patients were evaluated for hepatotoxicity: 337 developed hepatotoxicity, and 1298 had normal hepatic function. Patients with normal hepatic function had a significantly higher mean age of 68 versus 63.2 for patients with hepatotoxicity,  $p < 0.001$ , with significantly more male patients with hepatotoxicity (65%),  $p < 0.001$ . There were no significant differences in race distribution for patients who developed hepatotoxicity vs. those with normal hepatic function,  $p = 0.3$ . The most common comorbidities were diabetes (31.1%), hypertension (60%), obesity (27.5%), and cardiac arrhythmias (18.3%). The presence of hepatic diseases was not statistically different between groups,  $p = 0.38$ . Complete baseline characteristics are available in Table 1.

Table 1. Baseline characteristics.

|                               | Total<br>(N = 1635; 100.0%) | Hepatotoxicity<br>(N = 337; 20.6%) | Normal Liver<br>Function<br>(N = 1298; 79.4%) | p-Value |
|-------------------------------|-----------------------------|------------------------------------|-----------------------------------------------|---------|
| Patient age, years, mean (SD) | 67.098 (16.184)             | 63.270 (15.513)                    | 68.092 (16.213)                               | <0.001  |
| Patient age groups            |                             |                                    |                                               |         |
| • 18–39 years old             | 94 (5.7%)                   | 26 (7.7%)                          | 68 (5.2%)                                     | <0.001  |
| • 40–64 years old             | 579 (35.4%)                 | 145 (43.0%)                        | 434 (33.4%)                                   |         |
| • 65 and over                 | 962 (58.8%)                 | 166 (49.3%)                        | 796 (61.3%)                                   |         |
| Patient Sex                   |                             |                                    |                                               |         |
| • Female                      | 790 (48.3%)                 | 118 (35.0%)                        | 672 (51.8%)                                   | <0.001  |
| • Male                        | 845 (51.7%)                 | 219 (65.0%)                        | 626 (48.2%)                                   |         |

Table 1. Cont.

|                                               | Total<br>(N = 1635; 100.0%) | Hepatotoxicity<br>(N = 337; 20.6%) | Normal Liver<br>Function<br>(N = 1298; 79.4%) | p-Value |
|-----------------------------------------------|-----------------------------|------------------------------------|-----------------------------------------------|---------|
| Patient race                                  |                             |                                    |                                               |         |
| • Hispanic or Latino                          | 295 (18.0%)                 | 64 (19.0%)                         | 231 (17.8%)                                   | 0.303   |
| • Non-Hispanic Black                          | 155 (9.5%)                  | 33 (9.8%)                          | 122 (9.4%)                                    |         |
| • Non-Hispanic White                          | 1069 (65.4%)                | 209 (62.0%)                        | 860 (66.3%)                                   |         |
| • Other/Unknown                               | 116 (7.1%)                  | 31 (9.2%)                          | 85 (6.5%)                                     |         |
| Non-invasive Positive Pressure<br>Ventilation | 581 (35.5%)                 | 134 (39.8%)                        | 447 (34.4%)                                   | 0.069   |
| ICU                                           | 299 (18.3%)                 | 78 (23.1%)                         | 221 (17.0%)                                   | 0.010   |
| Ventilator                                    | 114 (7.0%)                  | 46 (13.6%)                         | 68 (5.2%)                                     | <0.001  |
| Comorbidities                                 |                             |                                    |                                               |         |
| Coronary heart disease                        | 414 (25.3%)                 | 58 (17.2%)                         | 356 (27.4%)                                   | <0.001  |
| Congestive heart failure                      | 189 (11.6%)                 | 21 (6.2%)                          | 168 (12.9%)                                   | <0.001  |
| Cardiac arrhythmias                           | 300 (18.3%)                 | 41 (12.2%)                         | 259 (20.0%)                                   | <0.001  |
| Valvular disease                              | 104 (6.4%)                  | 19 (5.6%)                          | 85 (6.5%)                                     | 0.542   |
| Pulmonary circulation disorders               | 83 (5.1%)                   | 11 (3.3%)                          | 72 (5.5%)                                     | 0.089   |
| Peripheral vascular disorders                 | 126 (7.7%)                  | 21 (6.2%)                          | 105 (8.1%)                                    | 0.255   |
| Chronic pulmonary disease                     | 379 (23.2%)                 | 56 (16.6%)                         | 323 (24.9%)                                   | 0.001   |
| Hypertension                                  | 982 (60.1%)                 | 184 (54.6%)                        | 798 (61.5%)                                   | 0.022   |
| Diabetes                                      | 509 (31.1%)                 | 85 (25.2%)                         | 424 (32.7%)                                   | 0.009   |
| Hypothyroidism                                | 147 (9.0%)                  | 25 (7.4%)                          | 122 (9.4%)                                    | 0.257   |
| Obesity                                       | 450 (27.5%)                 | 79 (23.4%)                         | 371 (28.6%)                                   | 0.060   |
| Coagulopathy                                  | 78 (4.8%)                   | 14 (4.2%)                          | 64 (4.9%)                                     | 0.551   |
| Deficiency anemia                             | 61 (3.7%)                   | 8 (2.4%)                           | 53 (4.1%)                                     | 0.140   |
| Renal failure                                 | 171 (10.5%)                 | 23 (6.8%)                          | 148 (11.4%)                                   | 0.014   |
| Liver disease                                 | 64 (3.9%)                   | 16 (4.7%)                          | 48 (3.7%)                                     | 0.376   |
| Peptic ulcer disease                          | 22 (1.3%)                   | 1 (0.3%)                           | 21 (1.6%)                                     | 0.061   |
| Rheumatoid arthritis                          | 71 (4.3%)                   | 11 (3.3%)                          | 60 (4.6%)                                     | 0.276   |
| HIV                                           | 8 (0.5%)                    | 3 (0.9%)                           | 5 (0.4%)                                      | 0.237   |
| Lymphoma                                      | 26 (1.6%)                   | 4 (1.2%)                           | 22 (1.7%)                                     | 0.507   |
| Metastatic cancer                             | 55 (3.4%)                   | 8 (2.4%)                           | 47 (3.6%)                                     | 0.258   |
| Solid tumor                                   | 171 (10.5%)                 | 26 (7.7%)                          | 145 (11.2%)                                   | 0.065   |
| Paralysis *                                   | 6 (0.4%)                    | 3 (0.9%)                           | 3 (0.2%)                                      | 0.075   |
| Neurological disorders                        | 135 (8.3%)                  | 20 (5.9%)                          | 115 (8.9%)                                    | 0.082   |
| Depression                                    | 297 (18.2%)                 | 46 (13.6%)                         | 251 (19.3%)                                   | 0.016   |
| Alcohol abuse                                 | 35 (2.1%)                   | 8 (2.4%)                           | 27 (2.1%)                                     | 0.740   |
| Drug abuse                                    | 27 (1.7%)                   | 4 (1.2%)                           | 23 (1.8%)                                     | 0.453   |
| Laboratory parameters                         |                             |                                    |                                               |         |
| ALT in unit/Liter, mean (SD) \$               | 6.039 (4.255)               | 7.189 (5.657)                      | 5.743 (3.759)                                 | <0.001  |
| AST in unit/Liter, mean (SD) #                | 6.064 (4.264)               | 7.189 (5.652)                      | 5.775 (3.775)                                 | <0.001  |
| Bilirubin in micromole/Liter,<br>mean (SD) ^  | 5.991 (4.177)               | 7.120 (5.578)                      | 5.700 (3.679)                                 | <0.001  |
| Creatinine in micromole/Liter,<br>mean (SD) & | 9.623 (11.096)              | 12.231 (13.957)                    | 8.951 (10.130)                                | <0.001  |
| LOS, mean (SD)                                | 8.390 (8.476)               | 10.395 (10.515)                    | 7.869 (7.782)                                 | <0.001  |
| Fluid and electrolyte<br>abnormalities        | 209 (12.8%)                 | 27 (8.0%)                          | 182 (14.0%)                                   | 0.003   |

Table 1. Cont.

|                                         | Total<br>(N = 1635; 100.0%) | Hepatotoxicity<br>(N = 337; 20.6%) | Normal Liver<br>Function<br>(N = 1298; 79.4%) | p-Value |
|-----------------------------------------|-----------------------------|------------------------------------|-----------------------------------------------|---------|
| COVID-19 therapeutics                   |                             |                                    |                                               |         |
| Remdesivir duration, days, mean (SD)    | 4.314 (1.405)               | 4.318 (1.493)                      | 4.314 (1.382)                                 | 0.963   |
| Dexamethasone use                       | 1610 (98.5%)                | 333 (98.8%)                        | 1277 (98.4%)                                  | 0.566   |
| Tocilizumab                             | 27 (1.7%)                   | 11 (3.3%)                          | 16 (1.2%)                                     | 0.009   |
| Other concurrent medications            |                             |                                    |                                               |         |
| Mycobacterium tuberculosis drugs        | 1 (0.1%)                    | 0 (0.0%)                           | 1 (0.1%)                                      | 0.612   |
| Antiarrhythmic drugs                    | 47 (3.4%)                   | 18 (6.4%)                          | 29 (2.7%)                                     | 0.002   |
| Antifungal agents                       | 38 (2.8%)                   | 10 (3.6%)                          | 28 (2.6%)                                     | 0.364   |
| Statins dyslipidemia drugs              | 818 (59.8%)                 | 154 (55.0%)                        | 664 (61.0%)                                   | 0.069   |
| Macrolide antibiotics                   | 224 (16.4%)                 | 60 (21.4%)                         | 164 (15.1%)                                   | 0.010   |
| Quinolone antibiotics                   | 77 (5.6%)                   | 20 (7.1%)                          | 57 (5.2%)                                     | 0.216   |
| Selective serotonin reuptake inhibitors | 300 (21.9%)                 | 42 (15.0%)                         | 258 (23.7%)                                   | 0.002   |
| Sympathetic agents                      | 39 (2.8%)                   | 18 (6.4%)                          | 21 (1.9%)                                     | <0.001  |
| Tricyclic antidepressants               | 42 (3.1%)                   | 6 (2.1%)                           | 36 (3.3%)                                     | 0.314   |
| Vancomycin                              | 280 (20.5%)                 | 74 (26.4%)                         | 206 (18.9%)                                   | 0.005   |

Abbreviation: AST: aspartate aminotransferase, ALT: alanine aminotransferase, HIV: human immunodeficiency virus, ICU: intensive care unit. \*: hemiplegia and paraplegia, (\$: normal ALT level 4–36 u/L, #: normal AST level 8–33 u/L, ^: normal bilirubin level 1.7–20.5 micromole/L, &: normal serum creatinine level 44–97 micromole/L) [20].

### 3.1. The Frequency and Grades of Remdesivir-Associated Hepatotoxicity

The overall median frequency of hepatotoxicity occurred in 319 patients (19.5%). To elaborate, the frequency of AST elevation occurred in 319 patients (19.5%), with the majority of patients developing grade 1 AST elevation (262; 16.5%), the frequency of ALT elevation occurred in 337 patients (20.6%), with most patients developing grade 1 ALT elevation (281; 17.7%), and the frequency of bilirubin elevation occurred in 122 patients (7.5%), with the majority of patients with grade 1 bilirubin elevation (40; 2.5%). Grades of hepatotoxicity are available in Figure 1.

We did not find differences in dexamethasone use among patients with hepatotoxicity (99.4%) versus those with normal liver function (98.3%),  $p = 0.14$ . Lastly, there were significantly fewer patients with hepatotoxicity with no ventilator, 44 (13.8%), versus 70 (5.3%) in patients with normal liver function,  $p < 0.001$ . Patients with hepatotoxicity have a statistically significantly longer mean duration of hospitalization, 10.3 days (SD 10.5) versus 7.6 (SD 7.7) for patients with normal liver function,  $p < 0.001$ . There were statistically significantly fewer patients requiring non-invasive positive pressure ventilation in the hepatotoxicity group, 138 (43.3%) versus 443 (33.7%) in patients with normal liver function,  $p = 0.001$ .

### 3.2. Predictors of Remdesivir-Associated Hepatotoxicity

After adjusting the logistic regression model, hepatotoxicity with remdesivir use was associated with patient age (OR 1.02, 95% CI: 1–1.04,  $p = 0.02$ ) and selective serotonin reuptake inhibitors (SSRI) use (OR 1.7, 95% CI: 1.1–2.6,  $p = 0.01$ ). Being male and ventilator use were negatively associated with hepatotoxicity with remdesivir (OR 0.63, 95% CI: 0.46–0.87,  $p = 0.005$ ) and (OR 0.24, 95% CI: 0.06–0.86,  $p = 0.02$ ), respectively. Risk factors of remdesivir-associated hepatotoxicity are available in Table 2.

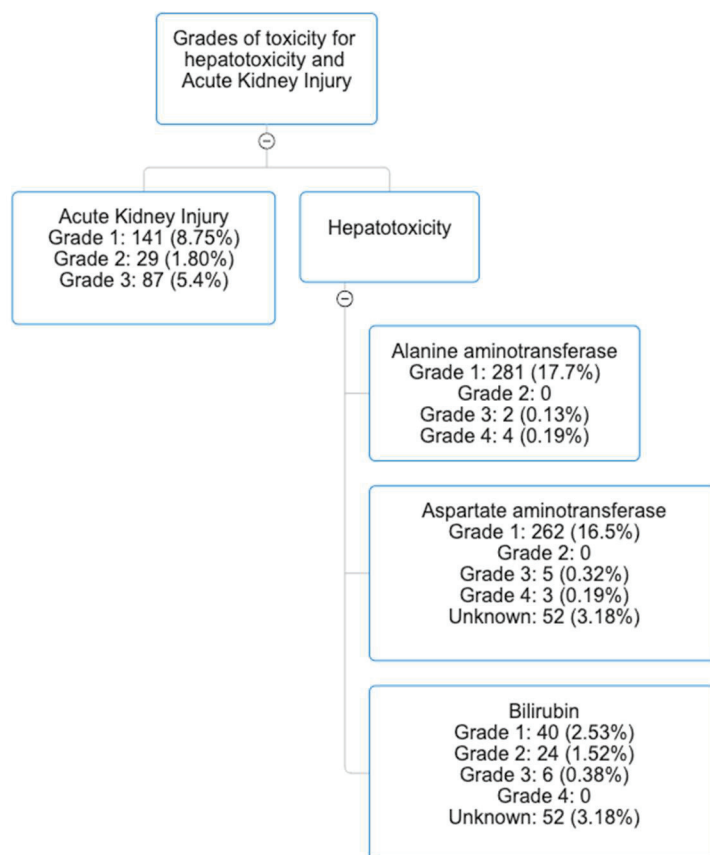


**Figure 1.** Grades of toxicities for hepatotoxicity and Acute Kidney Injury.

**Table 2.** Risk factors of remdesivir-associated hepatotoxicity.

| Variable                                  | Odds Ratio | 95% Confidence Interval | p-Value |
|-------------------------------------------|------------|-------------------------|---------|
| Patient age                               | 1.02       | 1–1.04                  | 0.02    |
| Male gender                               | 0.63       | 0.47–0.87               | 0.005   |
| Race                                      |            |                         |         |
| • Hispanic                                | 1.07       | 0.7–1.62                | 0.7     |
| • Black                                   | 0.86       | 0.5–1.45                | 0.57    |
| • Other                                   | 0.77       | 0.42–1.38               | 0.38    |
| ICU admission                             | 1.9        | 0.9–4.04                | 0.09    |
| Length of hospital stay                   | 0.97       | 0.94–1.01               | 0.17    |
| Ventilator use                            | 0.24       | 0.06–0.86               | 0.02    |
| SSRIs use                                 | 1.73       | 1.13–2.65               | 0.01    |
| Liver disease *                           | 0.68       | 0.33–1.38               | 0.28    |
| ALT                                       | 0.84       | 0.43–1.64               | 0.61    |
| AST                                       | 1.61       | 0.77–3.35               | 0.2     |
| Bilirubin                                 | 0.7        | 0.43–1.12               | 0.13    |
| Serum creatinine                          | 1.01       | 0.98–1.05               | 0.2     |
| Duration of remdesivir and hepatotoxicity | 0.99       | 0.91–1.08               | 0.96    |

Abbreviation: AST: aspartate aminotransferase, ALT: alanine aminotransferase, AKI: Acute Kidney Injury, ICU: intensive care unit. SSRI: Selective serotonin reuptake inhibitor. \*: liver disease based on clinical and laboratory values.

### 3.3. The Frequency and Grades of Remdesivir-Associated Acute Kidney Injury

The frequency of AKI with remdesivir use occurred in 280 patients (17.3%). Specifically, 141 patients (8.8%) developed grade 1 AKI, 29 patients (1.8%) developed grade 2 AKI, and

87 patients (5.4%) developed grade 3 AKI. Grades of AKI are available in Figure 1. Patients who developed AKI were on longer durations of remdesivir therapy; 4.5 days vs. 4.27 days in patients who did not develop AKI, OR 0.87 (95% CI: 0.79–0.93,  $p = 0.006$ ). Although the difference is statistically significant, it is clinically insignificant.

#### 4. Discussion

Remdesivir is an essential antiviral agent with a broad spectrum of activity against several viruses, including SARS-CoV-2 [3]. Remdesivir was a key player in controlling the COVID-19 pandemic. However, remdesivir does not come without significant toxicities. In this study, we evaluated the frequency and grades of hepatotoxicity and AKI in addition to the predictors of hepatotoxicity. We found the frequency of hepatotoxicity to be 19.5%, with most patients developing grade 1 hepatotoxicity based on ALT, AST, and bilirubin. Increasing age and SSRI use were predictors of hepatotoxicity, while male gender was a protective factor against remdesivir-associated hepatotoxicity. Moreover, the frequency of AKI was 17.3%, with most patients developing grade 1 AKI.

The median frequency of remdesivir-associated hepatotoxicity in our study (19.5%) has similarities and differences to the published literature. A study by Kim et al. evaluated hepatobiliary ADR with remdesivir therapy in COVID-19 patients, which included 2107 patients from VigiBase [11]. The authors found the median frequency of hepatotoxicity was 11.2%, which is lower than the estimates in our study, which could be explained by several factors. First, the study included ADRs since the inception of VigiBase; therefore, the study may have included indications other than remdesivir. In contrast, in our study, we included only COVID-19 patients. Thus, our study could provide more accurate estimates of remdesivir-associated hepatotoxicity in COVID-19 patients. In a randomized controlled trial, ACCT-1 evaluated the efficacy and safety of remdesivir in hospitalized COVID-19 patients and found the liver function test elevations to be 6% in both the remdesivir and placebo groups [3]. The difference compared to our study is that they did not specify the types of enzymes elevated, and there is a risk of bias. Lastly, a study by Wong et al. evaluated the risks of hepatotoxicity with remdesivir in COVID-19 patients and included 860 patients [21]. The study found the frequency of hepatotoxicity was 38.8%. The estimate of hepatotoxicity was higher compared to our study of 19.5%, perhaps due to the smaller sample size in the study by Wong et al., since it included 860 patients. Another study by Jinda et al. that evaluated hepatotoxicity from remdesivir in pediatric patients found that the frequency of hepatotoxicity was 18.2% [22]. Notably, the study has a limited sample size of only 66 patients. Lastly, a study by Seyedalipour et al. conducted in Iran to evaluate the hepatotoxicity of remdesivir found ALT and AST increased by 6.20 and 3.64 times, respectively [23]. From our study and other studies' findings, we believe the frequency of remdesivir hepatotoxicity is 20–30%.

Discussing specific liver enzymes, the abnormalities in liver enzymes in our study are comparable to other studies. Specifically, ALT was elevated in 20.6% of the patients, which is relatively close to estimates by Kim et al. of 17.6% [11]. In contrast, our finding of AST elevation was higher than that reported in the study by Kim et al.; our study found the frequency of AST elevation to be 19.5%, while the frequency of AST elevation in the study by Kim et al. was 11.2%. Ultimately, the bilirubin level elevation in our study was 7.5%, which contradicts the findings of the study by Kim et al., since they found 1.5% bilirubin elevation. Differences compared to our findings can be explained by several factors, including sample size and patient population, male gender, obesity, and truncal obesity [24]. Notably, some factors are not associated with COVID-19; still, it can impact the bilirubin level.

Among patients who developed hepatotoxicity, the majority of hepatic enzyme biomarkers (ALT, AST, and bilirubin) were grade 1 (mild hepatic impairment). Our findings have similarities to the study by Seyedalipour et al., since they found that the majority of the hepatotoxicity was grade 1 and grade 2, with OR for ALT 5.30 (95% CI: 3.39–8.27,  $p < 0.001$ ), and the OR for AST 3.11 (95% CI: 1.90–5.08,  $p < 0.001$ ) [23]. Similarly, a study by Wong et al. found that 79.6% of patients who developed hepatotoxicity were grade 1 and grade 2 without specifying how many patients were in grade 1 and grade 2 separately [21]. Similar to our study, other studies evaluating specific patients with grades of hepatotoxicity are lacking.

In our study, we evaluated the risk factors of hepatotoxicity with remdesivir use, and we identified 2 risk factors. After adjusting for risk of liver disease, we found that the higher the patient age in years, the higher the risk of remdesivir-associated hepatotoxicity, OR 1.02 (95% CI: 1–1.04,  $p = 0.02$ ). A likely explanation of age as a risk factor is that elderly patients' livers undergo cellular changes with aging, which make them susceptible to drug-induced hepatotoxicity [25]. Unfortunately, currently, no published studies evaluating the risk factors of remdesivir and hepatotoxicity in adult patients exist to compare against our study. However, a study by Jinda et al. evaluated risk factors of hepatotoxicity with remdesivir use in pediatric COVID-19 patients and found that the longer median duration of remdesivir use (OR 3.95, 95% CI: 0–5,  $p = 0.01$ ) and the higher the dose of remdesivir (OR 5.3, 95% CI: 0.5–10.3,  $p = 0.01$ ) were risk factors for remdesivir-associated hepatotoxicity [22]. Another risk factor for remdesivir-associated hepatotoxicity is the use of SSRIs, since we found the OR of 1.7 (95% CI: 1.1–2.6,  $p = 0.01$ ). Our finding is consistent with a study by Huang et al. that evaluated the risk of liver injury and found that SSRIs increase the odds of liver injury (OR 1.22, 95% CI: 1.16–1.29) [26]. Several types of lesions occur due to SSRI-induced liver injury by immunologic or idiosyncratic reactions, including acute hepatitis, cholestatic hepatitis, steatohepatitis, and transaminitis [27]. Lastly, in our study, male gender was found to be a protective factor against remdesivir-associated hepatotoxicity (OR 0.63, 95% CI: 0.47–0.87,  $p = 0.02$ ). A possible explanation for our findings was that females have a higher risk for drug-induced hepatotoxicity generally [28].

In our study, we evaluated the risk of AKI and found that 17.3% of the patients developed AKI, which is comparable to published studies. A study by Wong et al. found the frequency rate of AKI to be 15.9% [21]. Notably, the estimate of the AKI is robust in our study compared to the study by Wong et al., since we have a bigger sample size of more than 1600 patients. Another study by Li et al. evaluated the risk of AKI with remdesivir in COVID-19 patients using disproportionality analysis and found that remdesivir increases the odds of AKI with an OR of 2 (95% CI: 1.83–2.18) [12]. Regarding the grades of AKI, the majority of the patients developed grade 1 AKI. Currently, no studies have evaluated the grades of AKI to compare against our estimate.

To our knowledge, our study is multicenter and the first to study to identify risk factors of hepatotoxicity as well as estimate the grades of hepatotoxicity and AKI. Despite that, our study has limitations. First, it is a retrospective cohort with the possibility of missing information and the introduction of bias. The study is a retrospective cohort study and may not establish causality, but it can only establish associations related to the concerned research question. Our study was conducted in a single geographical location and may not be generalizable globally due to differences in healthcare systems, genetic profiles, treatment protocols, and concomitant medications. Our study lacks a control group to ascertain the association of hepatotoxicity and AKI with remdesivir; however, we adjusted for drugs that are associated with hepatotoxicity and AKI in our analysis (For example, Mycobacterium tuberculosis drugs, vancomycin, etc.). Some patients who developed hepatotoxicity or AKI do not have information regarding the grade of toxicity

due to missing laboratory information. We could not collect information on a specific SSRI type and dose, but we only evaluated the SSRI as a drug class. We could not obtain data regarding the AKI etiologies (pre-renal, intrinsic, or post-renal). There may be unknown confounders that were not measured. We could not retrieve the dosage regimens' data of concurrent medications. We could evaluate if there was clinical deterioration due to hepatic enzyme elevations or AKI. There were confounders due to complications of COVID-19; however, we performed multivariate logistic regression and adjusted for the potential confounders.

## 5. Conclusions

Remdesivir is an essential antiviral drug for the treatment of several viral illnesses, including COVID-19. Remdesivir is associated with several ADRs, more importantly, hepatotoxicity and AKI. The frequency of remdesivir-associated hepatotoxicity was 19.5%, with the majority of patients developing grade 1 hepatotoxicity. Predictors of hepatotoxicity include increasing age and the use of SSRIs. On the contrary, the male gender was a protective factor against remdesivir-associated hepatotoxicity. To add, the frequency of AKI was 17.3%, with the majority of patients developing grade 1 AKI. Therefore, clinicians should be vigilantly monitoring patients on remdesivir for hepatotoxicity and AKI through periodic assessment of liver function tests and serum creatinine concentrations, especially in elderly patients. Lastly, clinicians should be cautious when combining remdesivir with SSRIs.

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## Review

# Psychosocial Support Interventions for Adult Critically Ill Patients During the Acute Phase of Their ICU Stay: A Scoping Review

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## Abstract

**Background:** Addressing Intensive Care Unit (ICU) patients' psychological well-being is crucial, yet psychosocial support interventions that can facilitate effective coping, ultimately decreasing stress-related physiological, mental health, and cognitive sequelae, are not currently included in clinical practice guidelines and standards. **Objective:** To identify and synthesize research evidence on psychosocial support interventions in the ICU, including types of outcomes and measures of effectiveness, and to explore research gaps and barriers to implementation. **Method:** The review was directed by a protocol based on current guidance for scoping reviews. The quality of studies was assessed using the National Institute for Health and Clinical Excellence. The review focused on articles containing evaluations of psychosocial interventions through an experimental or quasi-experimental design or pretest-posttest comparisons. Databases searched included Medline, CINAHL, PubMed, PsychInfo, and the Cochrane Library. **Results:** Ten highly heterogeneous studies were identified, encompassing diverse interventions (e.g., relaxation, psychotherapy, spirituality, and positive suggestions) and patient populations. Across the 10 studies, no intervention type was replicated, and most samples were small and quasi-experimental, limiting internal validity and preventing quantitative synthesis. Despite these limitations, the evidence reviewed supports that various psychosocial interventions, including positive suggestions (constructive, reassuring thoughts), relaxation techniques, psychotherapy (emotional, behavioral guidance), and spiritual and/or religious support can alleviate psychological sequelae, such as depression, anxiety, and Post Traumatic Stress in ICU patients. **Conclusions:** This review highlights the positive impact of psychosocial interventions on alleviating psychological distress in ICU patients. However, a critical gap exists in understanding their effects on other clinical and physiological outcomes, necessitating comprehensive research.

**Keywords:** critical illness; ICU; adults; psychosocial support; holistic intervention

## 1. Background

The Intensive Care Unit (ICU) environment and its advanced treatment modalities can cause significant psychological distress for patients and their families, despite their life-saving impact [1,2]. Several invasive procedures in the ICU can elicit pain and be perceived as traumatic [3]. ICU patients may also experience acute stress and a range of negative emotions due to the unpredictability of their situation and fear of death [4]. Several studies have demonstrated high prevalence of anxiety and depression among ICU patients [5,6],

along with sensory disruption and sleep deprivation [7,8]. Uncontrolled stress in the ICU is associated with immune, metabolic, and organ dysfunction, increased pain, and sleep disturbances [9–12]. These result in numerous physiological and psycho-cognitive complications and increased mortality during and after the ICU stay [13].

ICU patients may continue to experience distressing flashbacks of their time in the ICU even after discharge, resulting in a decline in their overall psychological health [14,15]. Depression, anxiety, and stress are prevalent in more than half of ICU survivors and may last for months up to several years post-ICU [16–19]. Likewise, the prevalence of mental health disorders, including mood and personality disorders, substance use, Post Traumatic Stress Disorder (PTSD), psychosis, and schizophrenia, seems to be significantly higher in post-ICU survivors than in the general population [20].

Additionally, the stress experienced during an ICU stay is a factor in the post-intensive care syndrome (PICS). PICS is a culmination of cognitive, physical, and psychological impairments that persist after critical illness [21]. It is prevalent in approximately 65% at three and six months and 55% at one year after ICU discharge [22,23]. PICS can lead to readmission to the ICU, propagating a vicious circle of deterioration of well-being [24].

Addressing the psychological well-being of ICU patients is an important aspect of patient-centered care. However, current clinical guidelines and practice standards [25] focus primarily on physical recovery, with limited emphasis on psychological support. Pharmacological interventions, such as sedatives, are commonly used to manage stress in the ICU, but they are often ineffective and carry significant side effects [26,27]. Similarly, the current post-ICU care framework includes follow-up clinics and rehabilitation programs to support ICU survivors in their recovery. However, evidence suggests that the current approaches are ineffective [28]. Hence, integrating psychological support interventions during ICU stays is vital in preventing psychological distress and improving long-term outcomes in survivors.

Providing psychosocial support can improve mental health outcomes by helping patients and their families cope more effectively. Furthermore, improving the mental health of critically ill patients may also enhance physical recovery and reduce the strain on ICU resources. Psychosocial support refers to interventions that address the emotional, psychological, and social needs of critically ill patients and their families [29]. In ICU settings, this includes strategies such as stress management, family engagement, and mental health support to reduce distress and promote coping [30].

Psychosocial support interventions are grounded in stress-and-coping theory, which highlights how emotional and social support can reduce the negative effects of critical illness by promoting effective coping [31]. In nursing, Kolcaba's Comfort Theory supports these interventions by emphasizing the importance of relieving discomfort and promoting a sense of ease and well-being, especially in high-stress settings like the ICU [32]. Neuman's Systems Model also offers a relevant framework, viewing psychosocial support as a way to strengthen patients' adaptive capacity against stress and restore balance across physical, emotional, and social dimensions [33].

This study employs a scoping review methodology to systematically identify and synthesize existing evidence on psychosocial support interventions in the ICU. This approach was chosen for its ability to map the breadth and nature of research on psychosocial interventions for critically ill patients [34]. Thus, facilitating a comprehensive synthesis of current knowledge, thereby informing future research priorities and guiding evidence-based clinical practice.

### *Purpose*

The purpose of this study was to identify and synthesize research evidence on psychosocial support interventions in the ICU. Specific objectives included identifying (a) types of interventions studied, (b) types of outcomes assessed, (c) measures of effectiveness of interventions, (d) research gaps, and (e) identified barriers to implementation. We hope to provide a synthesis for healthcare providers seeking to implement these interventions in their practice and to motivate impactful change in the field of psychosocial health and well-being in critical care. For this work, we defined psychosocial interventions as interpersonal or informational approaches that target behavioral, cognitive, emotional, interpersonal, or social factors aiming to improve coping and well-being [35].

## **2. Methods**

The review was directed by a protocol based on current guidance for scoping reviews [36] and registered with the Open Science Framework (<https://doi.org/10.17605/OSF.IO/53FUE>). Reporting was guided by Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) [37]. The review was guided by the following question, based on the Population/Concept/Context format [36]: “What psychosocial interventions have been explored involving adults during the acute phase of ICU hospitalization, and what is the evidence of their effectiveness and feasibility within the context of psychological distress in the ICU?”

### *2.1. Eligibility Criteria*

Inclusion criteria: We included studies involving:

1. Primary studies of quantitative, qualitative, or mixed methods, reporting on any type of psychosocial intervention in ICU patients.
2. Studies involving interventions for adult intensive or critical care patients while still hospitalized in a critical/intensive care unit, regardless of their primary diagnoses and type of unit.
3. Peer-reviewed studies published since 2009 were included to capture evidence following the introduction of key ICU guidelines on pain, agitation, and delirium, which significantly changed clinical practice. This cut-off ensures the review reflects current standards of care.

Exclusion criteria: We excluded studies involving:

1. Case studies, literature reviews, opinion pieces, editorials, research protocols
2. Intervention(s) for family members only, not involving ICU patients
3. Patients under 18 years of age, such as neonates, infants, children, and paediatric patients.
4. Articles in any language other than English.

### *2.2. Information Sources and Search Strategy*

Databases searched included Medline, CINAHL, PubMed, PsychInfo, and the Cochrane Library. Moreover, hand searches of reference lists and forward citation searches were conducted to ensure all key articles are included. Grey literature and trial registries were not included in this review to ensure consistency and quality of evidence from peer-reviewed, published studies. The review focused on articles containing evaluations of psychosocial interventions, either through an experimental or quasi-experimental design or pretest-posttest comparisons. We employed a combination of natural language vocabulary and controlled terms derived from two main concepts: (a) ICU and (b) Psychosocial interventions. No sample size or outcome measures limitations were set. Studies were retrieved through online database searches, constructed through consultation with a library

information specialist. References of identified studies were also checked for relevancy. For Ovid/MEDLINE, the following search strategy was used: ((*"Intensive care"* OR *"critical care"* OR *"critical ill\*"* OR ICU) AND (patient\*) AND (Psychological\* OR mental\* OR emotion\*) adj3 (stress OR distress OR pressure OR strain OR tension OR anxiet\* OR anxiousness OR worry OR worrie\* OR nervous\*) AND ((Psychosocial OR spiritual\* OR religious OR religion) adj3 (intervention\* OR support\*) OR counsel\* OR *"positive suggestion\*"* OR *"positive messag\*"* OR mindfulness OR meditat\*)). The complete search strategy, including controlled vocabulary terms (e.g., MeSH) and Boolean operators for Ovid/MEDLINE, is provided in Appendix A.

### 2.3. Screening and Data Extraction

The studies retrieved from database searches were exported into Covidence (<https://www.covidence.org/>) for data management, removal of duplicates, and independent screening by reviewers. Two team members independently screened titles and abstracts of search outcomes for eligibility, and conflicts were resolved with a third reviewer. Articles that were deemed relevant for the topic under study were passed on to the full-text screening. Two reviewers screened independently; disagreements were resolved by a third reviewer. No kappa statistic was calculated. A data charting tool was iteratively developed by the research team and pilot tested on the first five articles to ensure all required data was captured. We extracted data on participant demographics such as age, sex, and race; ICU type; outcome variables; assessment tools intervention details such as frequency and duration and statistical/qualitative findings. Data was independently extracted by two reviewers using a data charting tool to ensure consistency and completeness. Any discrepancies or conflicts were resolved through a third reviewer. Following data extraction, the review team met to conduct a structured analysis, categorizing interventions, outcomes, and study characteristics. Patterns, gaps, and trends within the evidence were then synthesized to provide a comprehensive overview of psychosocial support interventions in the ICU.

### 2.4. Quality Assessment

The quality of studies was assessed using the National Institute for Health and Clinical Excellence (NICE) Checklist (2012), which contains five domains and evaluates aspects of internal and external validity [38]. The process was iterative and continued until consensus among 3 raters was achieved. Quality appraisal was used to inform synthesis and interpretation of findings. No studies were excluded based on the results of quality appraisal.

## 3. Results

Out of the initial 524 studies identified (MEDLINE = 232, CINAHL = 159, PubMed = 47, PsychInfo = 38, Cochrane review = 48), 160 duplicates were removed. Including two articles identified through manual hand-searching, 366 studies underwent title and abstract screening, with 40 entering the full text review stage. Ten studies were ultimately selected for data extraction (Figure 1).

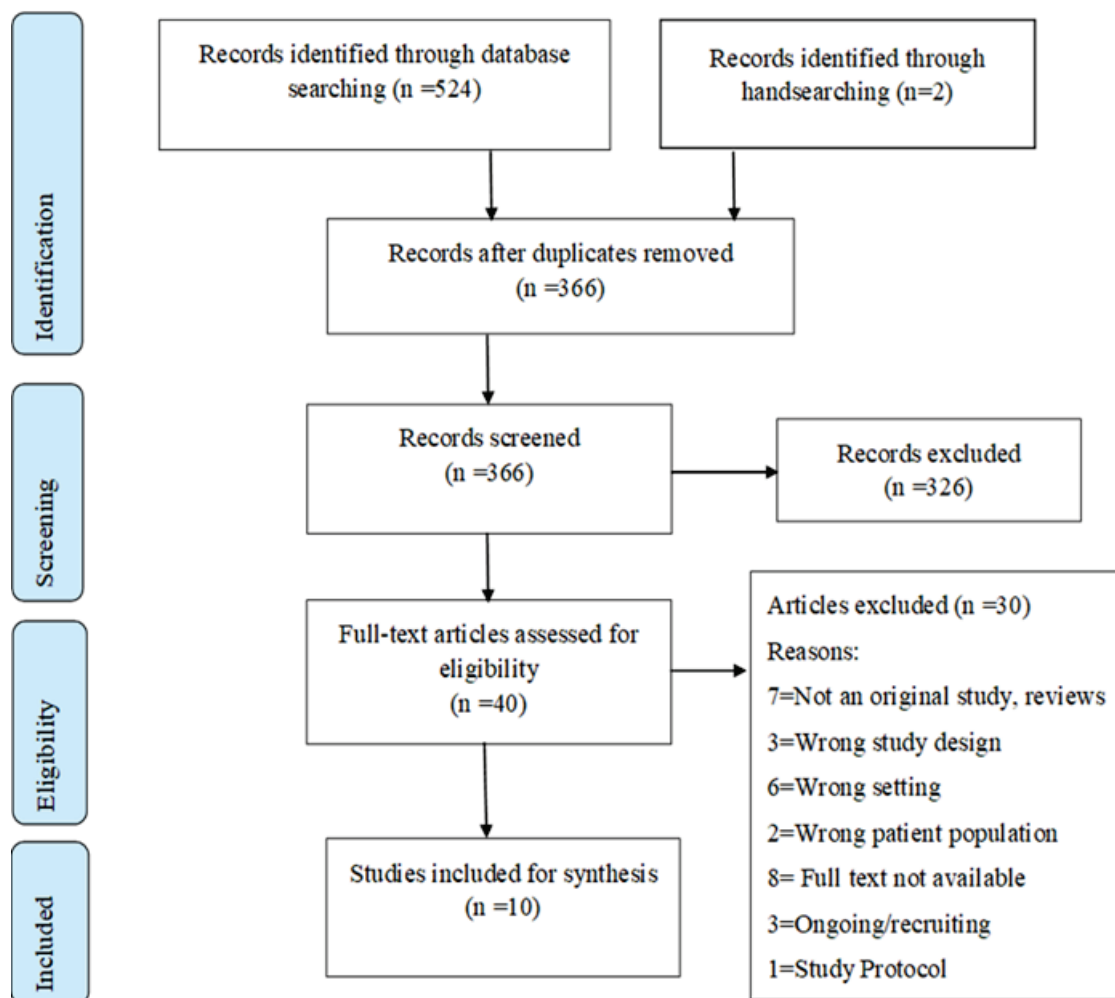


**Figure 1.** PRISMA Chart for Scoping Review.

### 3.1. Study Characteristics

Half of the studies ( $n = 5$ ) were conducted in the United States [39–43], while the rest took place in Iran, ( $n = 1$ ) [44], Hungary ( $n = 1$ ) [45], Germany ( $n = 1$ ) [46], China ( $n = 1$ ) [47], and the United Kingdom ( $n = 1$ ) [48] (Table 1). All studies included some sort of support intervention, including positive suggestions [41,42,45], relaxation techniques [39,43], spiritual and/or religious support [40,44], and psychotherapy-based [46–48]. In general, the samples were primarily white and Christian.

Of the identified ten studies, the majority adopted a quasi-experimental pretest-posttest design ( $n = 6$ ) [40–44,47], three were randomized controlled trials (RCTs) [39,45,46], and one was a mixed methods study [48]. Of the studies with quasi-experimental design, only two studies used control groups [42,44]. The number of participants ranged from 26 to 76, and samples were mostly male (Table 1). The outcomes addressed included measures of effectiveness of interventions with regard to improving psychological well-being, including anxiety, stress, pain, social support, depression, anxiety, delirium, length of ICU stay, length of mechanical ventilation, and feasibility and acceptability measures.

Table 1. Description and effectiveness of psychosocial interventions.

| Author (Year, Country)                   | Study Design                      | Aim of the Study                                                                                                                                                                  | Sample Size and Patient Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                            | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Outcome Variables and Measurement Tools                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Analysis Tools                   | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Study Conclusions                                                                                                                                                                   |
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| Bannon et al. (2020), United States [39] | Randomized Controlled Trial (RCT) | “Measure feasibility and acceptability markers (primary outcomes), including ability to recruit and retain dyads, acceptability of randomization, credibility, and satisfaction.” | <p># of participants: 16 dyads from a neuro-ICU. 7 allocated to receive RT intervention; 9 allocated to receive MEUC.</p> <p>Mean age: Patients-53.9 (<math>\pm 17.4</math>) years. Caregivers-48.88 (<math>\pm 10.62</math>) years.</p> <p>Gender: Patients-9 (56.3%) female. Caregivers-12 (75.0%) female.</p> <p>Race: Patients-14 (87.5%) White; 2 (12.5%) Asian. Caregivers-13 (81.3%) White; 2 (12.5%) Asian; 1 (6.3%) identified as more than one race.</p> | <p><b>Agent:</b> Unspecified clinician (discipline not specified).</p> <p><b>Recipient:</b> Stroke patients and their caregivers (dyads) with at least one person (patient or caregiver) at risk of chronic emotional distress</p> <p><b>Content:</b> Dyadic intervention incorporated elements of cognitive behavioral therapy (CBT), dialectical behavioral therapy (DBT), and trauma-informed care. Sessions focused on:</p> <ul style="list-style-type: none"> <li>• Deep breathing</li> <li>• Meditation</li> <li>• Self-care strategies</li> <li>• Stress management techniques</li> <li>• Effective communication skills</li> <li>• Coping with change</li> <li>• Developing and maintaining new habits</li> </ul> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"> <li>• Length: 20–30 min per session</li> <li>• Frequency: 6 sessions</li> <li>• Duration: Baseline (pre-test) to 6 weeks (post-test)</li> </ul> <p><b>Delivery Mode:</b> Not explicitly stated; likely face-to-face (unspecified).</p> <p><b>Setting:</b> Neuro-ICU</p> <p><b>Training:</b> No training requirements for the interventionist described.</p> | <p><b>Outcome variables:</b> Depression, anxiety, and post-traumatic stress (PTS)</p> <p><b>Measurement tools:</b> Hospital Depression and Anxiety Scale (HADS-D, HADS-A), PTSD Checklist-Civilian Version (PCL-C), General Self-Efficacy Scale (GSE), Measure of Current Status Part A (MOCs-A), Cognitive and Affective Mindfulness Scale-Revised (CAMS), and Intimate Bond Measure (IBM). Others included Credibility and Expectancy Questionnaire (CEQS) and the Client Satisfaction Questionnaire (CSQ-3). CSQ-3 was measured at post-test.</p> | Cohen's <i>d</i> for effect size | <p>Participants receiving RT showed a decrease in symptoms of depression, anxiety, and PTS in patients (<math>d = -0.41</math>, <math>-1.25</math>, <math>-0.83</math>, respectively) and caregivers (<math>d = -0.63</math>, <math>-0.81</math>, <math>-0.98</math>, respectively) from baseline to post-test. Participants who received only MEUC showed clinically significant increases in symptoms of depression, anxiety, and PTS in patients (<math>d = 0.98</math>, <math>0.44</math>, <math>0.68</math>, respectively) and in caregivers (<math>d = 0.71</math>, <math>0.48</math>, <math>0.46</math>, respectively). Resiliency variables (e.g., self-efficacy, mindfulness, perceived coping) showed small to large effect sizes (<math>d = 0.07</math>–<math>0.85</math>) in those who received the intervention but not in the control group from baseline to post-test.</p> | There is “promising evidence” that the RT intervention is a feasible and acceptable program for emotional distress in stroke patients and their caregivers when compared with MEUC. |

Table 1. Cont.

| Author (Year, Country)                    | Study Design       | Aim of the Study                                                                                                                                    | Sample Size and Patient Characteristics                                                                                                                                                                                                                           | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Outcome Variables and Measurement Tools                                                                             | Analysis Tools            | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Study Conclusions                                                                                                                                                              |
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| Berning et al. (2016, United States) [40] | Quasi-experimental | “To determine the feasibility and measure the effects of chaplain-led picture-guided spiritual care for mechanically ventilated adults in the ICU.” | <p># of participants: 50 patients in total. No control group was identified in this study.</p> <p>Mean age: 59 (<math>\pm 16</math>) years</p> <p>Gender: 28 (56%) male</p> <p>Race: 25 (50%) White, 12 (24%) Hispanic, 9 (18%) Black, 4 (8%) Southeast Asian</p> | <p><b>Agent:</b> Chaplain.</p> <p><b>Recipient:</b> “Mechanically ventilated adults in medical or surgical ICUs without delirium or dementia”</p> <p><b>Content:</b> Picture-guided spiritual care intervention, in English or Spanish, using illustrated communication cards to:</p> <ul style="list-style-type: none"> <li>• Assess spiritual affiliation</li> <li>• Explore emotions and needs (including spiritual pain)</li> <li>• Identify desired religious, spiritual, or nonspiritual support the chaplain could provide</li> <li>• Deliver tailored spiritual intervention accordingly</li> </ul> <p><b>Dose/Intensity:</b> Length: Total intervention less than 25 min:</p> <ul style="list-style-type: none"> <li>• 8.5 min (median; range 5–13) to complete communication card sections</li> <li>• 18 min (median; range 11–25) for chaplain to use the card and provide specific intervention</li> </ul> <p>Frequency: Not reported<br/>Duration: Not reported</p> <p><b>Delivery Mode:</b> Face-to-face, chaplain-led session using illustrated communication cards.</p> <p><b>Setting:</b> Medical and surgical ICU</p> <p><b>Training:</b> Not reported</p> | <p><i>Outcome variables:</i> Anxiety, stress</p> <p><i>Measurement tools:</i> 100-mm Visual Analog Scales (VAS)</p> | Wilcoxon signed-rank test | <p><i>Pre-Test vs. post-Test:</i></p> <p>Mean VAS score = 64 (<math>\pm 29</math>) vs. 44 (<math>\pm 28</math>) (absolute reduction, <math>p = 0.002</math>; relative reduction, <math>p = 0.001</math>). Mean score changed by 31%, <math>-20</math>; 95% CI, <math>-33</math> to <math>-7</math>.</p> <p>Follow-up (<math>n = 18</math>) reported mean 49-point reduction in stress (95% CI, <math>-72</math> to <math>-24</math>, <math>p = 0.002</math>).</p> <p><i>Qualitative comments:</i> “81% reported that they felt more capable of dealing with their hospitalization, 81% felt more at peace, 71% felt more connected with what is sacred, 96% would recommend chaplain-led picture-guided spiritual care to others, and 0% felt worse after receiving spiritual care.”</p> | Chaplain-led picture-guided spiritual care is feasible among mechanically ventilated adults and shows potential for reducing anxiety during and stress after an ICU admission. |

Table 1. Cont.

| Author (Year, Country)         | Study Design       | Aim of the Study                                                                                                                                                                                                             | Sample Size and Patient Characteristics                                                                                                                                                                                            | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Outcome Variables and Measurement Tools                                                                                                                                            | Analysis Tools                                                                                                                             | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Study Conclusions                                                                                                                                                                                                                                                               |
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| Elham et al. (2015, Iran) [44] | Quasi-experimental | "To investigate the effects of a need-based spiritual/religious intervention on spiritual well-being (SWB) and anxiety of the elderly admitted to the coronary care unit (CCU) of Imam Reza Hospital in Lar, southern Iran." | <p># of participants: 66 patients in total, with 33 patients each in the intervention group and control group</p> <p>Mean age: 68.86 (<math>\pm 8.3</math>) years</p> <p>Gender: 39 male, 27 females</p> <p>Race: Not reported</p> | <p><b>Agent:</b> Researcher</p> <p><b>Recipient:</b> Elderly patients admitted to the CCU</p> <p><b>Content:</b> Spiritual- and religious-based intervention that included:</p> <ul style="list-style-type: none"> <li>• Caring presence (30 min)</li> <li>• Providing hope and encouraging generosity</li> <li>• Strengthening personal relationships</li> <li>• Providing opportunities for worship and prayer</li> <li>• assisting them in performing religious obligations such as ablution, and hanging pictures of natural and relaxing landscapes on the walls of the ward</li> <li>• Providing Holy Quran, prayer books</li> <li>• Supplying Walkman audio players with relaxing music, prayers, and Quran verses</li> <li>• Facilitating patient visits with family and friends</li> <li>• Providing small booklets (prepared by researcher) with messages of hope, generosity, and forgiveness from religious scholars</li> </ul> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"> <li>• Length: 60–90 min</li> <li>• Frequency: Every evening</li> <li>• Duration: At least 3 consecutive days</li> </ul> <p><b>Delivery Mode:</b> Face-to-face interaction and provision of religious/spiritual materials</p> <p><b>Setting:</b> CCU</p> <p><b>Training:</b> Not reported.</p> | <p><b>Outcome variables:</b> SWB, anxiety</p> <p><b>Measurement tools:</b> Spielberger State-Trait Anxiety Inventory (S-Anxiety, T-Anxiety), Spiritual Well-Being Scale (SWBS)</p> | <p>Independent and paired <i>t</i>-tests, Pearson correlation coefficient, chi-square test, and repeated-measures analysis of variance</p> | <p><b>Post-test (Intervention):</b><br/>SWB scores = 79.03 (<math>\pm 10.95</math>) vs. 83.33 (<math>\pm 9.43</math>) (<math>p = 0.001</math>)</p> <p>S-Anxiety scores = 58 vs. 49 (<math>p &lt; 0.001</math>).</p> <p><b>Post-test (control):</b><br/>SWB scores = 80.06 (<math>\pm 10.36</math>) vs. 81.03 (<math>\pm 8.72</math>)</p> <p>S-Anxiety scores = 59 vs. 58.5</p> <p><b>Statistics:</b><br/>No significant difference was found between the 2 groups (intervention vs. control) before and after the intervention for SWB scores (<math>p = 0.049</math>).</p> <p>Significant difference between the intervention and control groups for S-anxiety and T-anxiety (<math>p &lt; 0.001</math>).</p> | <p>Individuals with strong religious beliefs and/or spiritual coping strategies have high SWB. This study's findings demonstrate a negative correlation between SWB and anxiety and that a spiritual/religious intervention may work to increase SWB in older CCU patients.</p> |

Table 1. Cont.

| Author (Year, Country)               | Study Design | Aim of the Study                                                                                                                                                    | Sample Size and Patient Characteristics                                                                                                                                                                                                                                                                                                         | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Outcome Variables and Measurement Tools                                                                                                                                                                                                                                                                                  | Analysis Tools                                                                                                        | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Study Conclusions                                                                                                                                                          |
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| Heilmann et al. (2016, Germany) [46] | RCT          | "To evaluate an intervention with individualized information and emotional support before coronary artery bypass grafting (CABG) in a controlled randomized trial." | <p># of participants: 253 CABG patients in total, with 139 in the intervention group and 114 in the control group</p> <p>Mean age: 68 (<math>\pm 10</math>) years</p> <p>Gender: 208 (82.2%) male, 45 (17.8%) female</p> <p>Race: 238 (94.1%) participants of German nationality, 15 (5.9%) participants of other unspecified nationalities</p> | <p><b>Agent:</b> Trained nurse.</p> <p><b>Recipient:</b> Patients scheduled for CABG</p> <p><b>Content:</b> Psychotherapeutic intervention including:</p> <ul style="list-style-type: none"> <li>• Open dialogue with patient</li> <li>• Short relaxation exercise</li> <li>• Acceptance of denied negative emotions</li> <li>• Reinforcement of confidence in the medical team and positive surgical outcome</li> <li>• Differentiation between vigilance vs. cognitive avoidance coping styles</li> <li>• Information on postoperative care, pain management, and ICU stay</li> <li>• Promoting emotional expression</li> </ul> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"> <li>• Length: 30 min</li> <li>• Frequency: One session</li> <li>• Duration: Delivered one day prior to CABG</li> </ul> <p><b>Delivery Mode:</b> Face-to-face, nurse-led psychotherapeutic session.</p> <p><b>Setting:</b> Coronary Care Unit</p> <p><b>Training:</b> Delivered by a trained nurse based on a specifically developed manual</p> | <p><b>Outcome variable:</b> Anxiety</p> <p><b>Measurement tools:</b> State-Trait Operation Anxiety (STOA-S, STOA-T), Visual Analog Scale (VAS)</p> <p><b>Evaluation timeline:</b> T0—after giving informed consent and before randomization, T1—in the evening after the intervention, and T2—on postoperative day 5</p> | <p>Multivariate analysis of variance, ANOVAs for continuous variables, chi-square tests for categorical variables</p> | <p><i>Intervention group:</i></p> <p>T0—Affective anxiety: <math>M = 10.19</math> (<math>\pm 3.90</math>).<br/>Cognitive anxiety: <math>M = 10.47</math> (<math>\pm 3.57</math>). VAS: <math>M = 3.53</math> (<math>\pm 2.88</math>). Trait anxiety: <math>M = 33.03</math> (<math>\pm 8.35</math>).<br/>T1—Affective anxiety: <math>M = 9.10</math> (<math>\pm 3.34</math>).<br/>Cognitive anxiety: <math>M = 9.09</math> (<math>\pm 3.19</math>). VAS: <math>M = 2.86</math> (<math>\pm 2.50</math>). Trait anxiety: Not reported.<br/>T2—Affective anxiety: <math>M = 7.97</math> (<math>\pm 2.68</math>).<br/>Cognitive anxiety: <math>M = 8.69</math> (<math>\pm 2.82</math>). VAS: <math>M = 1.01</math> (<math>\pm 1.65</math>). Trait anxiety: <math>M = 33.03</math> (<math>\pm 8.35</math>)</p> <p><i>Control group:</i></p> <p>T0—Affective anxiety: <math>M = 10.40</math> (<math>\pm 3.48</math>).<br/>Cognitive anxiety: <math>M = 11.26</math> (<math>\pm 3.53</math>). VAS: <math>M = 3.62</math> (<math>\pm 2.81</math>). Trait anxiety: <math>M = 35.19</math> (<math>\pm 9.31</math>).<br/>T1—Affective anxiety: <math>M = 10.08</math> (<math>\pm 3.43</math>).<br/>Cognitive anxiety: <math>M = 10.38</math> (<math>\pm 3.47</math>). VAS: <math>M = 3.39</math> (<math>\pm 2.69</math>). Trait anxiety: Not reported.<br/>T2—Affective anxiety: <math>M = 8.35</math> (<math>\pm 3.34</math>).<br/>Cognitive anxiety: <math>M = 9.29</math> (<math>\pm 0.00</math>). VAS: <math>M = 1.51</math> (<math>\pm 21.88</math>). Trait anxiety: Not reported.</p> <p><i>Statistics:</i></p> <p>Decreases in affective (F[1,299] = 14.284, <math>p &lt; 0.001</math>) and cognitive anxiety (F[1,299] = 17.457, <math>p &lt; 0.001</math>) in the intervention group were statistically significant (<math>p &lt; 0.001</math>), as were reductions in intervention VAS scores (F[1,299] = 12.207, <math>p &lt; 0.001</math>).</p> | <p>This particular intervention is effective at reducing pre- and postoperative anxiety in CABG patients, as opposed to providing them with routine information alone.</p> |

Table 1. Cont.

| Author (Year, Country)                         | Study Design       | Aim of the Study                                                                                                                                        | Sample Size and Patient Characteristics                                                                                                                                                                                                       | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Outcome Variables and Measurement Tools                                                                                                                                                                                                                                 | Analysis Tools    | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Study Conclusions                                                                                                                                                                                                                                                                |
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| Kamatovskaia et al. (2021, United States) [41] | Quasi-experimental | "To train and implement a PSBPS program for the critically ill using doulas, and measure acceptance of this intervention through stakeholder feedback." | <p># of participants: 43 critically ill patients in the intervention group. No control group was identified in this study.</p> <p>Mean age: Median age of participants 67 (58–74) years</p> <p>Gender: 58% male</p> <p>Race: Not reported</p> | <p><b>Agent:</b><br/>Two trained ICU doulas with a combined 15 years of experience.</p> <p><b>Recipient:</b><br/>ICU patients</p> <p><b>Content:</b><br/>PSBPS (Psychological Support and Behavioral Patient Support) intervention that included a training program for doulas. Specific approaches included:</p> <ul style="list-style-type: none"> <li>• Detailed ICU orientation</li> <li>• Unit protocols, safety, infection control, and hygiene via online modules</li> <li>• Instruction on using an online medical reference</li> <li>• Classroom instruction on suggestion training via recorded presentations</li> <li>• Role-playing PSBPS scenarios</li> <li>• Application of PSBPS to patients in ICU</li> <li>• Skills evaluation by reviewer pre- and post-training</li> <li>• Qualitative stakeholder feedback collected by a neutral third party</li> </ul> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"> <li>• Length: median 20 min</li> <li>• Frequency: Once daily</li> <li>• Duration: Median 4 days</li> </ul> <p><b>Delivery Mode:</b><br/>Face-to-face intervention delivered by ICU doulas</p> <p><b>Setting:</b><br/>ICU</p> <p><b>Training:</b><br/>Doulas underwent structured PSBPS training, including online modules (20–30 min each), classroom sessions, and role-play (~20 min) with skills evaluated before application.</p> | <p><b>Outcome variables:</b><br/>Doulas training effectiveness</p> <p><b>Measurement tools:</b><br/>Doulas PSBPS evaluation grading rubric divided into 'poor', 'good', and 'excellent'; qualitative questionnaires (open-ended questions) for stakeholder feedback</p> | Kirkpatrick model | <p><b>Doulas Training</b><br/><i>Pre-training performance:</i> Doulas performance was mostly in the 'good' range following the first standardized evaluation.<br/><i>Post-training performance:</i> Doulas performance was mostly 'excellent' after training sessions.<br/><i>Patient feedback:</i> "93% (n = 40) recalled doulas explaining what was happening to them, and 86% (n = 37) found this comforting. 67% (n = 29) remembered their hand being held; of those, 28 reported it as comforting. When asked what made them feel better while in the ICU, 79% (n = 34) recalled specific aspects with themes and representative responses."<br/><i>Family feedback:</i> Comments from families included those about how the intervention was soothing, helpful, reassuring, and comforting.<br/><i>Nurses' feedback:</i> Thirty-two bedside nurses commented. Thirty-four percent found that positivity may not reflect reality, it may overstep nurses' roles, intervention should be longer, and better coordination may be needed. Eighty-one percent found ICU doulas to be helpful. Major themes included the intervention being soothing/relaxing to the patient.</p> | Two doulas were successfully trained and were able to effectively provide PSBPS, as evidenced by the doulas' graded progress and stakeholder feedback themes. The training was beneficial to the doulas themselves and was also reported to be helpful by patients and families. |

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| Author (Year, Country)     | Study Design | Aim of the Study                                                                                                                                                      | Sample Size and Patient Characteristics                                                                                                                     | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Outcome Variables and Measurement Tools                                                                                                                                                                                                                                                       | Analysis Tools                                                    | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Study Conclusions                                                                                                                                                        |
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| Szilágyi et al., 2014 [45] | RCT          | "To investigate the effect of positive suggestions to ventilated patients in ICU via pre-recorded standard text delivered via the earphones and a simple MP3 player." | # of participants: 26; Control: 6, Music: 6, Suggestion: 6, Rejector: 8<br>Mean age: 65.34 (16.69) years<br>Gender: 26.92% (% Female)<br>Race: Not reported | <p><b>Agent:</b><br/>Pre-recorded MP3 messages delivered via headphones (male voice).</p> <p><b>Recipient:</b> Ventilated ICU patients</p> <p><b>Content:</b><br/>Positive suggestion intervention involving structured, reassuring messages promoting recovery and healing. Examples of the recorded suggestions include:</p> <ul style="list-style-type: none"><li>"As you begin to notice the signs of your recovery—the movement of tubes, machines, and equipment all centered around you—you come to realize that everything happening is for you, designed to support your healing even more effectively."</li><li>"You often experience a pleasant sensation. The way people are working around you, working for you, brings comfort. It's reassuring to know how important you are to this team."</li><li>"You begin to understand that asking something of your body is completely natural. Every cell is working for you—not just out of duty, but because it's their purpose. Everything is unfolding for your benefit."</li></ul> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"><li>Length: 30 min</li><li>Frequency: Once daily</li><li>Duration: Throughout ICU stay</li></ul> <p><b>Delivery Mode:</b><br/>MP3 and headphones; self-administered under supervision.</p> <p><b>Setting:</b><br/>ICU</p> <p><b>Training:</b><br/>Not applicable (pre-recorded intervention).</p> | <p>Length of mechanical ventilation</p> <p>Length of ICU stay</p> <p><i>Measurement tools:</i><br/>Not reported;</p> <p>presumably recorded from patient charts or the hospital's electronic medical records system</p> <p><i>Timing of assessment:</i> before and after the intervention</p> | <p>Independent samples <i>t</i>-test and analysis of variance</p> | <p><i>Mean and SD Length of mechanical ventilation</i><br/>Unified Control = 232.02 (165.60)<br/>Music = 135.33 (96.09)<br/>Suggestion = 85.25 (34.92)<br/><i>Mean and SD Length of stay in ICU</i><br/>Unified Control = 314.25 (178.40)<br/>Music = 187.75 (108.19)<br/>Suggestion = 134.24 (73.33)</p> <p><i>Statistics:</i><br/>Huge effect size for length of mechanical ventilation in the positive suggestion group (<math>d = 1.46, p &lt; 0.06</math>) compared to the control group<br/>Very large effect sizes for length of ICU stay in the positive suggestion group as compared to the control group (<math>d = 1.26, p &lt; 0.07</math>)<br/>Post-hoc analysis results showed that the length of ICU stays (<math>134.2 \pm 73.3</math> vs. <math>314.2 \pm 178.4</math> h) and the time spent on ventilator (<math>85.2 \pm 34.9</math> vs. <math>232.0 \pm 165.6</math> h) were significantly shorter in the positive suggestion group compared to the unified control.</p> | <p>Positive suggestions, delivered through a simple and accessible method like MP3 players, can be a valuable tool in improving patient outcomes in the ICU setting.</p> |
|                            |              |                                                                                                                                                                       |                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                               |                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                          |

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| Author (Year, Country)                | Study Design       | Aim of the Study                                                                                                                                                 | Sample Size and Patient Characteristics                                                                                                                                                                                                                                                                                                       | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Outcome Variables and Measurement Tools                                                                                                                                                                                                                                       | Analysis Tools                                                                                    | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Study Conclusions                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| Tan et al. (2020, United States) [42] | Quasi-experimental | "To investigate the feasibility of delivering psychological support based on positive suggestions (PSBPS) to reduce intubated patients' psychological distress." | <p># of participants: 76 patients in total. Thirteen in the intervention group and 63 in the control group.</p> <p>Mean age: 67 (57–72) years for the intervention group, 61 (53–70) years for the control group.</p> <p>Gender: 6 (46%) female in the intervention group, 29 (46%) female in the control group</p> <p>Race: Not reported</p> | <p><b>Agent:</b> Three study intensivists.</p> <p><b>Recipient:</b> Intubated patients with expected ICU stays of greater than 48 h</p> <p><b>Content:</b> PSBPS (Psychological Support and Behavioral Patient Support) intervention including: "(1) Physicians developed rapport with patients, (2) Once the patient is off sedation and able to communicate, the team gathers bidirectional connection by having the patient follow simple directions and be more active in treatment, (3) A final debrief- the patient is informed of what to expect after transferring to a recovery ward, fears are explored, and the ICU experience is normalized. Therapeutic touch is also utilized."</p> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"> <li>Length: Median 7 min (range 5–12 min)</li> <li>Frequency: Once daily</li> <li>Duration: entire ICU stay; median 4 days (IQR 2–6)</li> </ul> <p><b>Delivery Mode:</b> Face-to-face, intensivist-led sessions at the patient's bedside.</p> <p><b>Setting:</b> ICU</p> <p><b>Training:</b> Not reported</p> | <p><i>Outcome variables:</i> Feasibility (primary outcome), anxiety, depression, stress</p> <p><i>Measurement tools:</i> Hospital Anxiety and Depression Scale (HADS-A, HADS-D), Montreal Cognitive Assessment-Blind (MoCA-BLIND), Impact of Events Scale-Revised (IES-R)</p> | Wilcoxon signed-rank test, Pearson chi-square test, Fisher's exact test, linear regression models | <p><i>Post-test (Intervention):</i> MoCA-BLIND score = 16 (13 to 20), HADS-D score = 5 (4 to 9), HADS-A score = 6 (3 to 9), IES-R intrusion score = 0.9 (0.1 to 1.9), IES-R avoidance score = 1.1 (0.1 to 2.3), IES-R hyperarousal score = 1.3 (0.2 to 1.7).</p> <p><i>Post-test (Control):</i> MoCA-BLIND score = 17 (15 to 19), HADS-D score = 6 (3 to 9), HADS-A score = 7 (5 to 11), IES-R intrusion score = 1.0 (0.5 to 1.9), IES-R avoidance score = 0.8 (0.3 to 1.4), IES-R hyperarousal score = 1.0 (0.5 to 2.0).</p> <p><i>Statistics:</i> MoCA-BLIND &lt; 18 odds ratio 1.5 (<math>p = 0.95</math>), HADS-D <math>\geq 8</math> odds ratio 0.74 (<math>p = 0.64</math>), HADS-A <math>\geq 8</math> odds ratio 0.38 (<math>p = 0.24</math>), IES-R &lt; 1.6 odds ratio 1.04 (<math>p = 0.95</math>).</p> | This intervention was feasible, as evidenced by the high completion rate, minimal session interruptions, absence of adverse events, and acceptance from patients and their family members. Positive suggestion interventions coupled with medical treatment may be an effective method of reducing psychological distress in mechanically intubated patients. A larger randomized study may be needed to confirm the efficacy of PSBPS. |

Table 1. Cont.

| Author (Year, Country)                | Study Design       | Aim of the Study                                                                                                                        | Sample Size and Patient Characteristics                                                                                                                                                                                                                                       | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Outcome Variables and Measurement Tools                                                                                                                                                                                                                                                                                                                                            | Analysis Tools                          | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Study Conclusions                                                                                                                                                                             |
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| Ong et al. (2020, United States) [43] | Quasi-experimental | "To evaluate the feasibility and efficacy of using meditative virtual reality (VR) to improve the hospital experience of ICU patients." | <p># of participants: 46 patients in the intervention group. No control group was identified in this study.</p> <p>Mean age: 50 (<math>\pm 18</math>) years</p> <p>Gender: 30 (65%) male</p> <p>Race: 8 (18%) Black, 36 (78%) White, 2 (4%) other unspecified ethnicities</p> | <p><b>Agent:</b> Study staff.</p> <p><b>Recipient:</b> ICU patients from surgical and trauma ICUs</p> <p><b>Content:</b> Guided virtual VR-based meditative intervention that "consisted of a smartphone placed in a Google Daydream (vr.google.com/daydream) headset and a pair of Bluetooth headphones" collectively referred to as Digital Rehabilitation Environment Augmenting Medical System (DREAMS). Google Spotlight Stories' 'Pearl' (atap.google.com/spotlight-stories) was used to provide an orientation to VR, and 'Relax VR' was also used to "provide patients with a calm immersive scene with voice-guided meditation that promoted breath control and relaxation".</p> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"> <li>Length: 5–20 min</li> <li>Frequency: Once daily</li> <li>Duration: 7 days</li> </ul> <p><b>Delivery Mode:</b> VR headset and audio-guided meditation; staff-assisted.</p> <p><b>Setting:</b> Surgical and trauma ICU</p> <p><b>Training:</b> Not reported</p> | <p><b>Outcome variables:</b> Pain, sleep quality, affect, and delirium state</p> <p><b>Measurement tools:</b> Defense and Veterans Pain Rating Scale (DVPRS), Richards-Campbell Sleep Questionnaire (RCSQ), Hospital Anxiety and Depression Scale (HADS), Confusion Assessment Method for the ICU (CAMS-ICU). Questionnaire also administered to collect qualitative comments.</p> | Paired <i>t</i> -tests and mixed models | <p><i>Pain:</i> Dosage and frequency of opioid medications decreased at a rate of 12.9%. (<math>p &gt; 0.05</math>, 95% CI, 21.7–4.03)</p> <p><i>Sleep:</i> RCSQ score improved by 4.56 (<math>p &gt; 0.05</math>, 95% CI, 1.06–8.06).</p> <p><i>Affect:</i> statistically significant decreases in anxiety (estimate = 2.17; <math>p &lt; 0.05</math>, 95% CI, −4.23 to −0.106) and depression (estimate = −1.25, <math>p &gt; 0.05</math>, −95% CI, −2.37 to −0.129) were noted from before the first exposure to before the third exposure</p> <p><i>Delirium:</i> 13 patients of a total of 46 were delirious at least 1 day during admission. Seven participants were delirious prior to study but recovered before enrollment and remained non-delirious. Six became delirious after DREAMS.</p> <p><b>Qualitative comments:</b> Participants found DREAMS to be comfortable, enjoyable, and helpful for pain management. They expressed mixed feelings as to whether it helped them sleep better or not. Common themes included novelty of VR, emotionally evocative experiences, relaxation, technical frustrations, and temporary effects.</p> | <p>The use of meditative VR technology in the ICU was generally well-received by patients. The intervention improved patients' experiences in the ICU by reducing anxiety and depression.</p> |

Table 1. Cont.

| Author (Year, Country)                  | Study Design        | Aim of the Study                                                                                                                                   | Sample Size and Patient Characteristics                                                                                                                                                                                                        | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Outcome Variables and Measurement Tools                                                                                                                                                                                                                                                                                                                                                                                                                        | Analysis Tools                      | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Study Conclusions                                                                                                                                                              |
|-----------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wade et al. (2018, United Kingdom) [48] | Mixed Methods Study | To develop and test the feasibility of a psychological intervention to reduce acute stress and prevent future morbidity in critical care patients. | <p># of participants: Intervention feasibility study—127 patients. Trial feasibility study—86 patients. No control group was identified in this study.</p> <p>Mean age: Not reported</p> <p>Gender: Not reported</p> <p>Race: Not reported</p> | <p><b>Agent:</b><br/>Trained POPPI (Provision Of Psychological support to People in Intensive care) nurses.</p> <p><b>Recipient:</b><br/>ICU patients</p> <p><b>Content:</b><br/>Psychological support program including:</p> <ul style="list-style-type: none"><li>• Creation of a therapeutic environment</li><li>• Identification of patients with acute stress</li><li>• Delivery of three stress support sessions</li><li>• Relaxation and recovery program</li></ul> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"><li>• Median session lengths: 35 min (Session 1), 30 min (Sessions 2 and 3)</li><li>• Frequency: Ideally three sessions; 39 patients received 2–3 sessions, 5 received 1 session</li><li>• Duration: Sessions began within 48 h of IPAT screening; three sessions were ideally completed within one week</li></ul> <p><b>Delivery Mode:</b><br/>Face-to-face, nurse-led sessions at patient bedside.</p> <p><b>Setting:</b><br/>ICU.</p> <p><b>Training:</b><br/>POPPI nurses are trained via course materials to deliver intervention and create a therapeutic environment.</p> | <p><b>Outcome variables:</b><br/>Feasibility and acceptability; stress</p> <p><b>Measurement tools:</b><br/>Nurse and patient feasibility questionnaires, focus groups administered to nurses, “stress thermometers” on which patient’s reported their stress levels from 0 to 10 at the beginning and end of each stress support session, PTSD Symptom Severity Scale (PSS-SR), and the 10-Item Centre for Epidemiologic Studies Depression Scale (CES-D)</p> | Patient satisfaction questionnaires | <p><i>Intervention feasibility study:</i> All 10 POPPI nurses rated the face-to-face course as ‘good’ with nine (90%) rating relevance to their new role as ‘good’. 14 (93%) patients rated their satisfaction with stress support sessions as ‘good’. Twelve (80%) rated the number and duration of sessions as ‘just right’. Ten (67%) patients found they learned good coping strategies from the program.</p> <p>Stress reduced by a median of 3 points (IQR 1–5 points) from the start of the first session to the end of the third session among the 25 patients who received all three sessions.</p> <p><i>Trial feasibility study:</i><br/>“Completeness of the primary outcome measure (PSS-SR) was very good. From 1054 fields, only 24 (2.3%) had missing data.”</p> <p><i>Qualitative comments:</i><br/>Nurses found that the stress support sessions were welcomed and rewarding for patients and staff. They reported that the training had raised awareness, changed staff thinking, and led to better unit environments. Patient feedback on the stress support sessions included “every hospital should have it”, “it seemed a life saver”, and “I hope POPPI will eventually be used in all ICUs.”</p> | The POPPI psychological intervention to reduce stress and prevent long-term morbidity for critical care patients was feasible, acceptable, and ready for evaluation in a cRCT. |

Table 1. Cont.

| Author (Year, Country)         | Study Design       | Aim of the Study                                                                                                                | Sample Size and Patient Characteristics                                                                                                                                                                                                       | Intervention Details (Agent, Recipient, Content, Dose/Intensity, Delivery Mode, Setting, Training)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Outcome Variables and Measurement Tools                                                                                                                                                                                                                                                                        | Analysis Tools                                            | Main Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Study Conclusions                                                                                                                                                                                                                 |
|--------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yang et al. (2020, China) [47] | Quasi-experimental | "To explore the relationship between psychosocial support-related factors and the mental health of COVID-19-positive patients." | <p># of participants: 35 patients in the intervention group. No control group was identified in this study.</p> <p>Mean age: 57.00 (<math>\pm 13.44</math>) years</p> <p>Gender: 21 (60%) male, 14 (40%) female</p> <p>Race: Not reported</p> | <p><b>Agent:</b><br/>Trained psychotherapist and nurse.</p> <p><b>Recipient:</b> COVID-19-positive patients admitted to an isolated ICU</p> <p><b>Content:</b><br/>Psychological, face-to-face intervention focusing on relaxation and positive support. Specific approaches included:</p> <ul style="list-style-type: none"> <li>Evaluation of psychosocial impact of disease on patients and their family members and close friends</li> <li>Listening and providing positive attention</li> <li>Supportive psychotherapy and empathy</li> <li>Muscle and breath relaxation</li> <li>Cognitive-behavioural therapy (CBT)</li> </ul> <p><b>Dose/Intensity:</b></p> <ul style="list-style-type: none"> <li>Length: 15–30 min per session</li> <li>Frequency: 3 times per week</li> <li>Duration: Not reported</li> </ul> <p><b>Delivery Mode:</b><br/>In-person consultation</p> <p><b>Setting:</b><br/>Isolated ICU</p> <p><b>Training:</b><br/>Delivered by a trained psychotherapist and nurse; specific training not reported.</p> | <p><b>Outcome variables:</b><br/>Sleep, depression, anxiety, and social support</p> <p><b>Measurement tools:</b><br/>Chinese version of the Pittsburgh Sleep Quality Index (PSQI), Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder Assessment (GAD-7), Social Support Rate Scale (SSRS)</p> | ANOVA test, chi-square test, and linear regression models | <p><i>Pre-Test vs. post-test:</i><br/>Mean PSQI: 11.20 (<math>\pm 5.06</math>) vs. 49.16 (<math>\pm 31.27</math>), <math>p &lt; 0.0001</math></p> <p>Mean PHQ-9 = 8.80 (<math>\pm 4.26</math>) vs. 52.15 (<math>\pm 42.35</math>), <math>p &lt; 0.0001</math></p> <p>Mean GAD-7 score = 10.69 (<math>\pm 5.62</math>) vs. 63.86 (<math>\pm 42.62</math>), <math>p &lt; 0.0001</math></p> <p>Mean SSRS score = 25.57 (<math>\pm 4.60</math>) vs. 29.94 (<math>\pm 3.15</math>), <math>p = 0.046</math></p> <p><b>Statistics:</b><br/>Improved sleep quality was noted after intervention and was positively associated with improvement from COVID-19 (<math>p = 0.000</math>) and better social support (<math>p = 0.046</math>).</p> | "Physical and psychological well-being and sleep are affected by many social support-related factors".<br>Administering psychological interventions to COVID-19 patients in countries outside of China may also prove beneficial. |

Note. Data are extracted directly from the referenced publications without modification; no author interpretation has been applied.

Of the three RCTs, Heilmann et al. (2016) recruited 253 Coronary Artery Bypass Grafting (CABG) patients, mostly male [46]. Bannon et al. (2020) recruited 16 neuro-ICU patients with similar male/female distribution [39]. Szilágyi et al., 2014 recruited 26 ICU patients requiring mechanical ventilation, mostly male [45]. RCTs focused on outcomes such as depression, anxiety, post-traumatic stress (PTS), length of ICU stay, length of mechanical ventilation, and feasibility/acceptability. The only mixed-methods study did not use a control group (Wade et al., 2018) and addressed the feasibility and acceptability of a stress management intervention in ICU patients [48]. The study recruited 127 patients and did not report on the age and sex/gender of the participants.

### 3.2. Quality Appraisal of Included Studies

The results of the quality appraisal of the included studies are demonstrated in Table 2. The studies exhibited a mixed level of quality. As expected, all quasi-experimental studies displayed a high risk of bias in terms of randomization, allocation concealment, outcome measures, and analysis. Furthermore, the absence of sufficient descriptions regarding the study approaches posed challenges in determining the overall quality of the included studies. However, no studies were excluded from the synthesis on the basis of methodological quality, ensuring a comprehensive and inclusive evidence base.

The majority of the articles did not provide information on the allocation method employed for assigning participants to either the intervention or control group, so selection bias cannot be excluded [40–44,47]. Only four studies effectively minimized internal threats to validity through randomization to group allocation [39,45,46,48]. Among these, only three RCT studies implemented measures to maintain allocation concealment [39,45,46]. All included studies furnished sufficient details regarding the intervention utilized and the characteristics of both the comparison and intervention groups. Additionally, all studies employed comparable follow-up durations for both groups. However, due to the inherent nature of the interventions, blinding of participants and/or personnel was not feasible, resulting in a high risk of performance bias across all studies.

All studies employed reliable outcome measures and evaluated important outcomes relevant to the study. Moreover, all studies utilized appropriate analysis methods and provided sufficient data for effect size calculation, with the exception of one study [48]. Only one study had sufficient power and reported effect size data [46]. However, the majority of studies ( $n = 7$ ) did not report estimates of effect size [39–41,43,47,48]. Additionally, two studies had inadequate sample sizes to detect any intervention effects [42,44]. In three studies (not all participants were included in the analysis, and it remained unclear whether an intention-to-treat analysis was applied [39,42,46]. Upon analysis, only one study demonstrated poor internal validity [44], while another study exhibited limitations in terms of generalizability [41].

Table 2. Appraisal of identified studies using the National Institute for Health and Clinical Excellence (NICE) Checklist.

| Author and Date                                                                     | Bannon<br>et al. (2020)<br>[39] | Berning<br>et al. (2016)<br>[40] | Elham<br>et al. (2015)<br>[44] | Heilmann<br>et al. (2016)<br>[46] | Karnatovskaia<br>et al. (2021)<br>[41] | Ong et al.<br>(2020) [43] | Szilágyi<br>et al. (2014)<br>[45] | Tan et al.<br>(2020) [42] | Wade et al.<br>(2018) [48] | Yang et al.<br>(2020) [47] |
|-------------------------------------------------------------------------------------|---------------------------------|----------------------------------|--------------------------------|-----------------------------------|----------------------------------------|---------------------------|-----------------------------------|---------------------------|----------------------------|----------------------------|
| Is the source population or source area well described?                             | +                               | +                                | +                              | ++                                | –                                      | ++                        | ++                                | ++                        | ++                         | ++                         |
| Is the eligible population or area representative of the source population or area? | ++                              | ++                               | ++                             | ++                                | –                                      | ++                        | ++                                | ++                        | ++                         | +                          |
| Do the selected participants or areas represent the eligible population or area?    | ++                              | ++                               | ++                             | ++                                | –                                      | +                         | ++                                | ++                        | ++                         | +                          |
| Was selection bias minimised?                                                       | ++                              | NR                               | NR                             | ++                                | NR                                     | NR                        | ++                                | –                         | +                          | NR                         |
| Were interventions (and comparisons) well described and appropriate?                | ++                              | ++                               | +                              | ++                                | ++                                     | +                         | ++                                | ++                        | +                          | +                          |
| Was the allocation concealed?                                                       | ++                              | NR                               | NR                             | ++                                | NA                                     | NA                        | ++                                | –                         | NR                         | NR                         |
| Were participants or investigators blind to exposure and comparison?                | –                               | NA                               | NR                             | +                                 | NA                                     | NA                        | ++                                | –                         | NR                         | NA                         |
| Was the exposure to the intervention and comparison adequate?                       | +                               | NA                               | ++                             | +                                 | NA                                     | NA                        | ++                                | +                         | +                          | NA                         |
| Was contamination acceptably low?                                                   | ++                              | NA                               | ++                             | ++                                | NA                                     | NA                        | ++                                | ++                        | NR                         | NA                         |
| Were other interventions similar in both groups?                                    | ++                              | NA                               | ++                             | ++                                | NA                                     | NA                        | ++                                | ++                        | NA                         | NA                         |
| Were all participants accounted for at study conclusion?                            | –                               | ++                               | –                              | –                                 | ++                                     | NR                        | ++                                | ++                        | ++                         | NR                         |
| Did the setting reflect standard Canadian practice?                                 | ++                              | ++                               | ++                             | ++                                | ++                                     | ++                        | ++                                | ++                        | ++                         | +                          |
| Did the intervention or control comparison reflect standard Canadian practice?      | ++                              | ++                               | ++                             | +                                 | +                                      | ++                        | ++                                | ++                        | ++                         | ++                         |
| Were outcome measures reliable?                                                     | +                               | +                                | +                              | +                                 | +                                      | +                         | ++                                | +                         | +                          | +                          |

Table 2. Cont.

| Author and Date                                                                       | Bannon<br>et al. (2020)<br>[39] | Berning<br>et al. (2016)<br>[40] | Elham<br>et al. (2015)<br>[44] | Heilmann<br>et al. (2016)<br>[46] | Karnatovskaia<br>et al. (2021)<br>[41] | Ong et al.<br>(2020) [43] | Szilágyi<br>et al. (2014)<br>[45] | Tan et al.<br>(2020) [42] | Wade et al.<br>(2018) [48] | Yang et al.<br>(2020) [47] |
|---------------------------------------------------------------------------------------|---------------------------------|----------------------------------|--------------------------------|-----------------------------------|----------------------------------------|---------------------------|-----------------------------------|---------------------------|----------------------------|----------------------------|
| Were all outcome measurements complete?                                               | ++                              | ++                               | +                              | ++                                | –                                      | ++                        | +                                 | ++                        | +                          | ++                         |
| Were all important outcomes assessed?                                                 | +                               | +                                | +                              | +                                 | +                                      | +                         | +                                 | +                         | +                          | +                          |
| Were outcomes relevant?                                                               | ++                              | ++                               | ++                             | ++                                | ++                                     | ++                        | ++                                | ++                        | ++                         | ++                         |
| Were there similar follow-up times in exposure and comparison groups?                 | ++                              | NA                               | ++                             | ++                                | NA                                     | NA                        | NA                                | ++                        | NA                         | NA                         |
| Was follow-up time meaningful?                                                        | +                               | ++                               | +                              | +                                 | ++                                     | ++                        | NA                                | ++                        | NR                         | +                          |
| Were exposure and comparison groups similar at baseline? If not, were these adjusted? | ++                              | NA                               | ++                             | ++                                | NA                                     | NA                        | ++                                | ++                        | ++                         | NA                         |
| Was intention to treat (ITT) analysis conducted?                                      | NR                              | NR                               | NR                             | NR                                | NA                                     | NR                        | NR                                | NR                        | NR                         | NR                         |
| Was the study sufficiently powered to detect an intervention effect (if one exists)?  | NR                              | NR                               | –                              | ++                                | NR                                     | NR                        | –                                 | –                         | NR                         | NR                         |
| Were the estimates of effect size given or calculable?                                | NR                              | NR                               | NR                             | +                                 | NR                                     | NR                        | ++                                | NR                        | NR                         | NR                         |
| Were the analytical methods appropriate?                                              | ++                              | +                                | +                              | ++                                | +                                      | +                         | ++                                | +                         | –                          | +                          |
| Was the precision of intervention effects given or calculable? Were they meaningful?  | ++                              | +                                | +                              | ++                                | NA                                     | +                         | ++                                | ++                        | –                          | +                          |
| Are the study results internally valid (i.e., unbiased)?                              | +                               | +                                | –                              | ++                                | +                                      | +                         | ++                                | +                         | +                          | +                          |
| Are the findings generalizable to the source population (i.e., externally valid)?     | +                               | ++                               | +                              | ++                                | –                                      | +                         | ++                                | +                         | +                          | +                          |

++ the study has been designed or conducted in such a way as to minimize the risk of bias. + either the answer to the checklist question is not clear from the way the study is reported, or the study may not have addressed all potential sources of bias for that particular aspect of study design. – significant sources of bias may persist. NR: Not reported—study under review fails to report how they have (or might have) been considered. NA: Not applicable—study design aspects that are not applicable given the study design under review.

### 3.3. Types of Interventions

The identified interventions were based on positive suggestions [41,42,45], psychotherapy techniques [46–48] relaxation techniques [39,43], spiritual and/or religious support [40,44] (Table 3). Each intervention differs in its approach and techniques, and no interventions have been replicated in this body of evidence. All interventions were delivered during patients' ICU stay.

**Table 3.** Summary of Interventions, Outcomes, and Study Quality.

| Author (Year, Country)                          | Study Design                      | Intervention Type                                                                    | Outcome                                                                                                     | Study Quality |
|-------------------------------------------------|-----------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------|
| Bannon et al. (2020, United States) [39]        | Randomized Controlled Trial (RCT) | Relaxation-based intervention with family caregiver                                  | Decreased anxiety and post-traumatic stress in both stroke patients and caregivers during ICU               | Moderate      |
| Berning et al. (2016, United States) [40]       | Quasi-experimental                | Spiritual-religious-based intervention                                               | Reduced anxiety and stress in mechanically ventilated patients                                              | Low           |
| Elham et al. (2015, Iran) [44]                  | Quasi-experimental                | Spiritual- and religious-based intervention                                          | Increased spiritual well-being and decreased anxiety in older coronary care unit patients                   | Low           |
| Heilmann et al. (2016, Germany) [46]            | RCT                               | Psychological support by trained nurses                                              | Reduced pre- and postoperative anxiety in Coronary Artery Bypass Grafting (CABG) patients                   | Moderate      |
| Karnatovskaia et al. (2021, United States) [41] | Quasi-experimental                | Positive suggestions                                                                 | After training, doulas can effectively provide reassuring support, thereby reducing ICU patients' distress. | Moderate      |
| Szilágyi et al., 2014 [45]                      | RCT                               | Positive suggestions via prerecorded messages                                        | Reduced length of ICU stays and the time spent on ventilator                                                | High          |
| Tan et al. (2020, United States) [42]           | Quasi-experimental                | Positive suggestions                                                                 | Reduced psychological distress in mechanically intubated patients                                           | Low           |
| Ong et al. (2020, United States) [43]           | Quasi-experimental                | Guided virtual VR-based relaxation intervention                                      | Reduced anxiety and depression in surgical and trauma ICUs                                                  | Low           |
| Wade et al. (2018, United Kingdom) [48]         | Mixed Methods Study               | Psychological support by trained staff                                               | Improved coping and reduced stress                                                                          | Moderate      |
| Yang et al. (2020, China) [47]                  | Quasi-experimental                | Psychological, face-to-face intervention focusing on relaxation and positive support | Improved sleep quality, depression, and anxiety in isolated ICU patients with COVID-19                      | Low           |

Spiritual-religious-based interventions, facilitated by chaplains or researchers, emphasize spiritual care, worship, and assessing spiritual needs, typically lasting from 25 min to 90 min. The *Picture-guided spiritual care* intervention (25 min; delivered once) involved chaplain-led sessions using communication cards to assess spiritual affiliation, emotions, and needs in conscious ICU patients requiring mechanical ventilation [40]. Similarly, another spiritual/religious-based intervention delivered by researchers (60–90 min for 3 days) included caring presence, instilling hope, encouraging generosity, strengthening per-

sonal relationships, and providing opportunities for worship and prayer in coronary care unit patients [44].

Positive suggestion-based interventions, administered by psychotherapists, nurses, study intensivists, ICU doulas, or even delivered via pre-recorded messages through MP3 players, focused on building confidence and rapport, exploring fears, and normalizing ICU experiences, with sessions ranging from 5 to 30 min. Similarly, the *Psychological Support Based on Positive Suggestions* (PSBPS) intervention (5–12 min, once daily throughout the patient’s ICU stay) involved physicians developing rapport and therapeutic touch with patients, addressing fears, and normalizing the ICU experience, delivered by study intensivists [41,42]. It consisted of a debriefing with information on what to expect after transferring to a recovery ward and an opportunity to explore fears. Szilágyi et al. (2014) used prerecorded text focused on promoting recovery and healing delivered via MP3 players and headphones to ventilated ICU patients (30-min sessions, once daily throughout their ICU stay) [45].

Psychotherapy-based interventions often overlapped with other interventions, as they included relaxation and/or information-delivery sessions. A psychotherapeutic intervention (15–30 min, 3 days/week) provided by a psychotherapist consisted of listening, positive attention, supportive psychotherapy, empathy, muscle and breath relaxation, and cognitive behavioral therapy [47]. The *Provision Of Psychological Support to People in Intensive Care* (POPPI) consisted of three stress support sessions and a relaxation and recovery program provided by trained staff [48]. Sessions started within 48 h of the Intensive Care Psychological Assessment Tool (IPAT) screening, and a total of three sessions were delivered. A psychotherapeutic intervention (30 min, once before CABG) by Heilmann et al. (2016) comprised open dialogue, relaxation exercises, and emotional support, provided by trained nurses one day prior to CABG [46]. This intervention also included information regarding surgery, postoperative care, pain management, ICU stay, and emotional support.

Relaxation-based interventions, led by clinicians, study staff, or trained nurses, concentrate on stress management, breath control, coping skills, and psychosocial impact assessment, with sessions lasting from 20 to 30 min and occurring multiple times per week. The *Recovering Together* (20–30 min) included elements of cognitive behavioral therapy, dialectical behavioral therapy, and trauma-informed care [39]. Tangible facets of this intervention focused on deep breathing, meditation, self-care, stress management, and appropriate communication. A similar guided virtual VR-based meditative intervention, *RelaxVR* (5–20 min, 7 days), provided by study staff, consisted of calm immersive scenes with voice-guided meditation that promoted breath control and relaxation [43].

### 3.3.1. Psychological Well-Being Outcomes

We narratively synthesized the results, and we calculated effect sizes where pertinent data were available (Table 4).

**Table 4.** Measures of effect of identified interventions.

| Author, Year                             | Intervention                                     | Psychological Outcome | EFFECT SIZE                                 |
|------------------------------------------|--------------------------------------------------|-----------------------|---------------------------------------------|
| <b>A. Relaxation-based Interventions</b> |                                                  |                       |                                             |
| Bannon et al., 2020 [39]                 | Recovering Together                              | Anxiety<br>PTS        | $d = -1.25$<br>$d = -0.83$                  |
| Ong et al. (2020) [43]                   | virtual reality-based<br>meditative intervention | Anxiety<br>Depression | inadequate data to calculate<br>effect size |

Table 4. Cont.

| Author, Year                                      | Intervention                                        | Psychological Outcome                                       | EFFECT SIZE                              |
|---------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------|------------------------------------------|
| <b>B. Psychotherapy-based Interventions</b>       |                                                     |                                                             |                                          |
| Yang et al. (2020) [47]                           | in-person relaxation and support                    | Depression<br>Anxiety<br>Social support                     | inadequate data to calculate effect size |
| Wade et al. (2018) [48]                           | Psychological support                               | Stress<br>Coping                                            | inadequate data to calculate effect size |
| Heilmann et al. (2016) [46]                       | psychotherapy to provide emotional support          | <i>Immediately After intervention:</i><br>cognitive anxiety | $d = -0.39$                              |
|                                                   |                                                     | affective anxiety                                           | $d = -0.125$                             |
|                                                   |                                                     | VAS                                                         | $d = -0.20$                              |
|                                                   |                                                     | <i>On postoperative day 5:</i><br>VAS                       | $d = -0.28$                              |
|                                                   |                                                     | affective anxiety                                           | $d = -0.125$                             |
|                                                   |                                                     | Cognitive anxiety                                           | $d = -0.17$                              |
| <b>C. Spirituality-based interventions</b>        |                                                     |                                                             |                                          |
| Elham et al. (2015) [44]                          | spiritual- and religious-based interventions        | SWB<br>S-anxiety<br>T-anxiety                               | inadequate data to calculate effect size |
| Berning et al. (2016) [40]                        | spiritually based interventions                     | Anxiety<br>Stress                                           | inadequate data to calculate effect size |
| <b>D. Positive suggestion-based interventions</b> |                                                     |                                                             |                                          |
| Tan et al. (2020) [42]                            | psychological support based on positive suggestions | Anxiety<br>Depression<br>Stress                             | inadequate data to calculate effect size |
| Karnatovskaia et al., 2021 [41]                   | Psychological Support Based on Positive Suggestions | Stress<br>Coping                                            | inadequate data to calculate effect size |

Bannon et al. (2020) conducted a dyadic intervention, *Recovering Together*, for stroke patients and their caregivers who were at risk for chronic emotional distress such as depression, anxiety, and PTS (N = 16; Intervention (I) = 7 and Control (C) = 9) [39]. Outcomes were assessed post intervention during ICU stay and 3 months post discharge from ICU. The control group received minimally enhanced usual care, including an informational pamphlet on the stroke experience and post-stroke recovery for patients and their informal caregivers. *Recovering Together* showed evidence of being a feasible and acceptable intervention in reducing risk for chronic anxiety and post-traumatic stress in both stroke patients and caregivers during ICU. Within-group effect sizes demonstrated improvement in all emotional distress outcomes (decrease in symptoms of depression, anxiety, and post-traumatic stress) between baseline and post-test with medium to very large effect sizes in the ICU patients (anxiety, Cohen's  $d$  ( $d$ ) =  $-1.25$ , post-traumatic stress,  $d$  =  $-0.83$ , and depression,  $d$  =  $-0.42$ ). Additionally, when compared with the control group, from baseline to post-intervention (during ICU) to 3 months, a general improvement in emotional distress for dyads in the intervention group and a general deterioration in symptoms for those in the control group was noted. However, the very small sample size restricts confidence in any between-group comparisons. In another RCT, Heilmann et al. (2016) developed a 30 min intervention rooted in psychotherapy to provide emotional support for CABG surgery patients in the ICU (N = 253; I = 139 and C = 114) [46]. Significant decreases were only noted for State-Trait Operation Anxiety within the intervention group when compared with the control group. We calculated effect sizes of the intervention, based on reported data. We noted medium to very small effect sizes immediately after intervention (cognitive anxiety,  $d$  =  $-0.39$ , affective anxiety,  $d$  =  $-0.125$  and Visual Analog Scale (VAS),  $d$  =  $-0.20$ ).

On postoperative day 5, the effect size for VAS was small ( $d = -0.28$ ) and very small for affective anxiety ( $d = -0.125$ ) and cognitive anxiety ( $d = -0.17$ ). This nurse-delivered intervention is feasible for CABG patients; although its impact on anxiety was modest, it offers a low-intensity model warranting further evaluation in larger trials.

Wade et al. (2018), through a patient interview, demonstrated that psychological support intervention by trained nurses can develop appropriate coping strategies in ICU patients (10 of 15 patients) [48]. Among 25 participants, stress measured through a stress thermometer illustrated a reduction of three points (IQR = 1–5 points) in just 3 sessions, but the reported data are not appropriate for an effect size calculation.

Similarly, Ong et al. (2020) explored the effects of guided virtual reality-based meditative intervention on pain, sleep quality, affect, and delirium in surgical and trauma ICU patients [43]. The intervention showed statistically significant improvement in anxiety and depression symptoms after two sessions. Moreover, results of the patient questionnaires revealed that the intervention was comfortable, enjoyable, and relaxing. Yang et al. (2020) investigated the effect of an in-person relaxation and support approach on sleep, depression, anxiety, and social support among patients with COVID-19 in an isolated ICU [47]. Pre-post-intervention comparisons demonstrated the potential of the intervention to significantly reduce depression and anxiety. However, the reported mean scores for PSQI (11.20 vs. 49.16), PHQ-9 (8.80 vs. 52.15), and GAD-7 (10.69 vs. 63.86) exceeded the possible ranges of these instruments (PSQI: 0–21; PHQ-9: 0–27; GAD-7: 0–21). These values are presented as reported in the original publication and should be interpreted with caution.

Elham et al. (2015) used spiritual- and religious-based interventions in ICU patients and showed the potential of spiritual-based interventions to significantly reduce anxiety during the ICU stay [44]. The study results indicated that the spiritual/religious intervention could enhance spiritual well-being and reduce state anxiety and trait anxiety in the elderly admitted to the Coronary Care Unit (Table 1), but the reported data were not sufficient for an effect size calculation. Similarly, Berning et al. (2016) demonstrated that spiritual-based interventions can significantly reduce anxiety and stress during the ICU stay [40]. Patients reported an immediate reduction in anxiety post-intervention, and the outcome persisted even after the ICU discharge, as testified by follow-up with the ICU survivors.

Tan et al. (2020) demonstrated that positive suggestions can reduce psychological distress in mechanically intubated patients, but the data were not adequate to calculate effect size [42]. Similarly, Karnatovskaia et al. (2021) determined that after extensive training, doulas can effectively provide PSBPS to the ICU patients [41]. Though quantitative data were not collected, patient interviews and feedback strongly indicated that PSBPS offered profoundly reassuring support, thereby reducing ICU patients' distress.

### 3.3.2. Other Clinical Outcomes

Only three studies focused on clinical outcomes in ICU patients. Szilágyi et al. (2014) found significant reductions in both length of ICU stay (LOS) and length of mechanical ventilation in ICU patients [45]. Effect sizes, calculated from study data, were very large for both LOS ( $d = 1.26$ ) and length of mechanical ventilation ( $d = 1.46$ ) compared to controls. From the available data, we calculated the effect size comparing the suggestion group versus the music group and found a medium to large effect size (LOS:  $d = 0.58$ ; length of mechanical ventilation:  $d = 0.69$ ). While these results are promising, the small sample size and marginal  $p$ -values indicate that the findings should be interpreted with caution.

Yang et al. (2020) demonstrated the potential of in-person relaxation and support approaches to significantly improve sleep among patients with COVID-19 in an isolated ICU [47]. However, Ong et al. (2020) reported that guided virtual reality-based meditative

intervention showed no significant improvement in pain, sleep, and delirium scores in surgical and trauma ICU patients [43]. The reported data were not sufficient for effect size calculations.

### 3.3.3. Feasibility and Acceptability

Tan et al. (2020) and Karnatovskaia et al. (2021) explored the effectiveness of PSBPS intervention to reduce distress in the ICU patients [41,42]. Both identified that various stakeholders, including patients, families, and providers, regarded the intervention as useful and effective. Tan et al. (2020) demonstrated the efficacy and feasibility of PSBPS to reduce psychological distress in mechanically intubated patients [42]. Karnatovskaia et al. (2021) determined that after extensive training, doulas can effectively provide PSBPS to the ICU patients [41].

Berning et al. (2016) confirmed that the spiritual-based interventions are feasible for ICU patients [40]. Furthermore, the patient interview confirmed that the intervention was well accepted and assisted patients in dealing with the unpredictability of their illness.

Wade et al. (2018) provided psychological support to ICU patients by delivering three stress support sessions and a relaxation and recovery program [48]. The POPPI intervention was administered by trained nurses. Additionally, follow-up interviews revealed that the stress support sessions were welcomed by intervention administrators, patients, and staff. Results from the patient satisfaction questionnaire determined that patients were highly satisfied and appreciated the intervention. Furthermore, nurses' interviews testified that the training had raised awareness, changed staff thinking, and led to better unit environments.

## 4. Discussion

We attempted a synthesis of a very heterogenous body of research exploring the effects of psychosocial interventions during ICU hospitalization. Heterogeneity stemmed from the designs, types, and delivery of interventions and participant populations and characteristics. The majority of included studies used quasi-experimental design, of which four used no control group and two were feasibility studies, and all had small sample sizes, resulting in a high risk of bias. Overall, our analysis unveiled a scarcity of studies investigating psychosocial interventions in ICU patients, comprising only 3 randomized controlled trials, of which only one was adequately powered to explore effectiveness. Despite these shortcomings, the evidence reviewed supports that various psychological interventions, including positive suggestions, relaxation techniques, psychotherapy, and spiritual and/or religious support, can alleviate psychological sequelae, such as depression, anxiety, and PTS in ICU patients. There is limited evidence to support effects on sleep in ICU patients, as only two studies included this outcome, and only one study suggested an effect on ICU LOS and length of mechanical ventilation. Although some identified interventions may not have received attention in evidence syntheses, the evidence reviewed here highlights the need to further explore these modalities to improve holistic care in the ICU.

Although few studies have assessed the feasibility and acceptability of interventions, evidence to date shows that psychological support interventions are feasible, well accepted, and associated with higher patient satisfaction. Additionally, a gender disparity in the samples was noted, with a predominant male participation. Moreover, the majority of participants in the identified studies were Caucasian and Christians, which raises the need to further explore the effectiveness and transferability of these results in diverse samples. A wide range of interventions was explored with great diversity in the way of delivery, including who delivered the interventions and their duration, timing, and frequency.

There was no replication of interventions across studies, which may limit the validity of individual interventions.

The majority of identified studies lacked clear reporting on intervention duration and frequency, limiting the interpretability of their findings and making replication challenging. Future research should adopt standardized reporting frameworks, such as the Template for Intervention Description and Replication (TIDieR) [49], to provide precise details on intervention duration, frequency, and total sessions, thereby enhancing reproducibility and facilitating clinical translation. Additionally, there was considerable variability among the included studies with regard to outcome assessment tools used. We strongly recommend that future research employ standardized and validated tools to improve consistency, facilitate comparability across studies, and enable more robust evidence synthesis.

Despite the methodological limitations noted, these findings are important, as stress may prolong recovery times and increase the risk of complications in critically ill patients [9,10,12]. The only prior review in this area, a 2010 critical review by Papathanasoglou, examined studies published before 2009 and highlighted the potential of interventions such as psychological support, communication strategies, and sensory stimulation for ICU patients [50]. Since 2009, the introduction of key ICU guidelines on pain, agitation, and delirium has significantly shaped clinical practice, promoting more patient-centered care and increasing the use of non-pharmacologic interventions. Acknowledging the paramount effect of stress, the Society of Critical Care Medicine (SCCM) also advocates for exploring psychosocial interventions for alleviating ICU-related outcomes [51]. Given these shifts and the expanding evidence base, this scoping review is well warranted to synthesize recent research, address implementation challenges, and inform effective psychosocial support strategies in modern ICUs.

Strengthening coping mechanisms has the potential to alleviate the intensity of the stress response, interrupting the cascade of physiological and psychological responses that stem from the psychological burden of stress. Positive suggestions, delivered during sedation or mechanical ventilation, can help reduce threat appraisal and catastrophic thinking, thereby lowering anxiety and promoting a sense of safety. Findings of a meta-analysis of 26 RCTs suggest that positive suggestion techniques might be useful to alleviate anxiety in postoperative patients [52]. Similarly, supportive psychotherapy may target maladaptive coping patterns, reducing avoidance and hyperarousal that contribute to post-traumatic stress symptoms. A systematic review and meta-analysis demonstrated that positive psychological responses, such as optimism and positive affect, are significantly associated with the health outcomes and mortality in CABG patients [53]. Furthermore, relaxation-based interventions, including guided imagery, can modulate autonomic arousal, leading to improvements in pain perception, sleep quality, and overall psychological well-being. Through this theoretical scaffolding, it becomes evident why such interventions may influence psychological outcomes such as anxiety, PTSD, or sleep while having limited direct impact on physiological endpoints such as delirium, ventilator days, or ICU length of stay.

Spirituality can help to transcend suffering, pain, distress, and despair. Our review demonstrated that providing opportunities for worship and prayer can help spiritual well-being of ICU patients and reduce anxiety. It has been proposed that spiritual care practices help facilitate meaning-making out of the despair of illness [54–56]. Additionally, surveys [57] and reviews [58,59] in ICU patients, including post-cardiac arrest patients [60], have demonstrated that spirituality/religiosity plays a significant role in coping with crises and nurturing optimism. Despite the importance of addressing spiritual needs, spiritual care is not commonly incorporated into daily critical care practice [59], and it may often be considered part of end-of-life care [59–62].

Our review also indicates the dearth of evidence on psychosocial support interventions aimed at managing clinical outcomes such as delirium, pain, sleep, and length of ICU stays in the ICU patients [43,47]. While the evidence supported the effectiveness of in-person relaxation and support approaches in enhancing sleep among isolated COVID-19 patients, there remains a scarcity of data concerning other crucial outcomes such as delirium, pain, and the duration of ICU stay. However, studies in other acute care populations have yielded promising results for patient survival both during hospitalization and after discharge through psychosocial support interventions [63,64]. Additionally, psychosocial interventions were found effective in enhancing overall quality of life when compared with conventional therapies in traumatic brain injury patients [65]. Moreover, a recent systematic review further supports the positive impact of psychosocial interventions, revealing beneficial effects on the quality of life, emotional distress, and existential distress in terminally ill patients [66].

Positive suggestion-based interventions seem to be an emerging approach. In our review, we identified one RCT and two feasibility studies on positive suggestion-based interventions. These studies support the effectiveness of positive suggestion-based interventions in improving clinical outcomes, including decreasing LOS, speeding weaning from mechanical ventilation, and improving chances of survival [45] and decreasing psychological distress [42]. Existing evidence also supports that positive suggestions can diminish pain, decrease medication intake, improve chances of survival, and influence physiological factors, such as blood pressure during surgery [52,67–70].

Our review also highlights the need for a shift in current ICU practices to embrace holistic care that focuses on both the psychological and physical aspects of critical illness. This gap is, in part, a result of the absence of clinical practice guidelines addressing stress assessment and management [71]. The Canadian Standards of ICU Nursing (2017) currently places a higher emphasis on physiological outcomes and comfort, often sidelining crucial psychological aspects of patient care [72]. In contrast, both the American Association of Colleges of Nursing (AACN, 2019) [73] and UK competency standards [74] appear to be more inclusive. The AACN standards, rooted in the synergy model, advocate for a holistic approach, placing significant emphasis on the psychological well-being of patients [73]. AACN guidelines recommend the provision of spiritual care to ICU patients; however, this remains limited to end-of-life needs [75]. Similarly, the UK competency standards adopt a comprehensive view that recognizes the intertwined nature of both physiological and psychological dimensions [74]. In alignment with AACN and UK standards, the SCCM's Pain, Agitation/Sedation, Delirium, Immobility, and Sleep guideline (PADIS) [76] recommends the ABCDEF care bundle, such as sedation minimization, delirium prevention, and family engagement. However, the focus of PADIS is predominantly physiologic, with limited attention to the comprehensive psychological needs of critically ill patients. While bundled physiological ICU care, such as the ABCDEF care bundle, is increasingly standardized, psychosocial interventions remain experimental and are not yet established as standard practice. The European Federation of Critical Care Nurses specifies "patient comfort and psychological care" as an important competency but provides no elaboration of the specific approaches [77]. There is a pressing need for these guidelines to align with a patient-centric approach to intensive care, emphasizing the profound impact of addressing psychological well-being on overall patient outcomes.

## 5. Research Implications

Psychosocial support interventions are clinically relevant in ICU settings, addressing the emotional, cognitive, and social needs of patients and families. However, their integration into routine care is limited by several barriers, including insufficient mental

health staffing, competing clinical priorities, and a lack of standardized protocols [78,79]. Organizational culture, time constraints, and inconsistent leadership support further hinder implementation. To facilitate uptake, psychosocial care must be embedded within ICU workflows through defined roles, interdisciplinary training, and structural support. Engaging interdisciplinary team members, such as ICU doulas or allied health staff, can make interventions more practical and sustainable by reducing the workload on bedside nurses. Additional strategies, including brief “micro-sessions” ( $\leq 20$  min), structured scripts, fidelity checks, and alignment with ICU rounds, can help ensure consistent delivery. Future research should not only evaluate intervention outcomes but also focus on validating standardized interventions, assessing implementation across diverse healthcare contexts, and incorporating both clinical and economic outcomes. Specifically, multicenter trials should pair validated psychological measures with delirium incidence and duration, as well as sedative exposure, prespecify clinically meaningful differences, and adopt fidelity monitoring for intervention delivery. Furthermore, studies should incorporate equity considerations—including sex/gender, socioeconomic position, culture and language, and geography—to develop scalable, culturally sensitive, and representative ICU interventions.

## 6. Limitations

The conclusions of this scoping review are limited by the heterogeneity and quality of the individual studies, as well as by small sample size. The predominantly White and Christian composition of study samples further constrains the generalizability of the findings. In addition, we only focused on English publications and those published after 2009, introducing the potential to have excluded studies that might have otherwise met these inclusion criteria. Our focus on the last 15 years was meant to capture the most recent evidence and avoid pooling current studies with older ones, which may represent very different contexts of care, because the context of care was different prior to publication of clinical practice guidelines regarding pain, agitation, and delirium in the ICU.

## 7. Conclusions

The review highlights the feasibility and positive outcomes associated with psychosocial interventions delivered during ICU stays but also notable methodological limitations in the identified studies, with a dearth of full RCTs. Psychological support approaches include modalities such as positive suggestions, relaxation, and spiritual or religious support.

We noted a critical gap in understanding the impact of psychosocial interventions on clinical outcomes such as delirium, pain, length of mechanical ventilation, and ICU LOS. The review raises concerns about the lack of diversity and representation in research participants, particularly regarding gender and cultural backgrounds. This points to the importance of ensuring that interventions are applicable and effective across diverse populations to promote inclusivity in critical care practices.

The results emphasize the necessity of a holistic shift in ICU practices, advocating for the importance of recognizing and integrating the interconnected nature of physical and psychological well-being. The shift could involve integrating psychosocial interventions into routine patient care to deliver patient-centered care in the ICU setting. Therefore, there is a need for more comprehensive research to generate high-quality evidence on both clinical and economic outcomes. Future multicenter trials should pair validated psychological measures with delirium incidence/duration and sedative dose, prespecify clinically meaningful differences, and adopt fidelity monitoring for intervention delivery.

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Validation, E.P., K.V. and U.P.; Resources, E.P.; Writing-original draft, E.P., K.V. and U.P.; Writing-review and editing, E.P., K.V. and U.P.; Supervision, E.P. All authors have read and agreed to the published version of the manuscript.

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## Appendix A

### Appendix A.1. Search Strategy (OVID/MEDLINE)

| SN | Searches                                                                                                                                                                             | Results    |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1  | ((“Intensive care” or “critical care”) adj3 (unit* or ward* or floor* or nurs*)).mp.                                                                                                 | 530,360    |
| 2  | “critical* ill*”).mp.                                                                                                                                                                | 202,608    |
| 3  | ICU.ti,ab.                                                                                                                                                                           | 241,335    |
| 4  | 1 or 2 or 3                                                                                                                                                                          | 718,543    |
| 5  | patient*.mp.                                                                                                                                                                         | 21,576,739 |
| 6  | ((Psychological* or mental* or emotion*) adj3 (stress or distress or pressure or strain or tension)) or anxiet* or anxiousness or worry or worrie* or nervous*).mp.                  | 3,215,392  |
| 7  | ((Psychosocial or spiritual* or religious or religion) adj3 (intervention* or support*)) or counsel* or “positive suggestion*” or “positive messag*” or mindfulness or meditat*).mp. | 687,587    |
| 8  | 4 and 5 and 6 and 7                                                                                                                                                                  | 626        |
| 9  | (neonat* or p?ediatric* or child* or infant*).mp.                                                                                                                                    | 8,285,783  |
| 10 | 8 not 9                                                                                                                                                                              | 444        |
| 11 | remove duplicates from 10                                                                                                                                                            | 334        |
| 12 | 11 and 2009:2023.(sa_year).                                                                                                                                                          | 232        |

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## Article

# Workplace Violence, Self-Perceived Resilience and Associations with Turnover Intention Among Emergency Department Nurses: A Cross-Sectional Study

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## Abstract

**Background/Objectives:** Workplace violence remains an important vocational psychosocial risk for nurses employed in the emergency department (ED). We investigated the characteristics of workplace violence against ED nurses, and associations with self-assessed resilience, socio-demographic and vocational parameters, including turnover intention. **Methods:** ED nurses employed in all public hospitals in the Republic of Cyprus (RC) participated. After obtaining informed consent, data were collected using census sampling (January–June 2024) via the translated 2016 Italian National Survey on Violence towards Emergency Nurses Questionnaire (QuINVIP16) for investigating workplace violence characteristics, and the Connor-Davidson Resilience Scale (CD-RISC-25) for assessing self-perceived resilience. **Results:** A total of 132 nurses (53.0% response rate) participated. Verbal violence was reported by 70.5% to 92.4% of participants. Long waiting times, overcrowded EDs, and perception of inadequate attention from healthcare professionals were reported as the primary triggers for violence towards participants by patients/visitors. One-third of participants reported that violence-reporting systems were unclear, while 1 out of 4 reported inadequate safety measures against violence. Participants with higher scores of self-perceived resilience were less likely to report turnover intention due to workplace violence ( $p < 0.001$ ), while those with lower self-perceived resilience reported a significant decrease in work motivation ( $p = 0.005$ ). Those who experienced decreased work motivation after exposure to a violent episode were more likely to consider a) leaving the profession [OR (95%CI): 79.1(17.7–353.2);  $p < 0.01$ ], and b) moving to a different work setting [OR (95%CI): 17.0(3.8–76.2);  $p < 0.01$ ], and actually applying to be transferred to a different work setting [OR (95%CI): 19.6(4.2–91.5);  $p < 0.01$ ]. Moreover, those who had not attended communication skills training were 4 times more likely to consider leaving the profession following exposure to violence [OR (95%CI): 4.2(1.1–16.2);  $p = 0.04$ ]. **Conclusions:** This study is among the few to link workplace violence with both resilience and actual turnover behaviors among emergency nurses, in general and particularly in the post-pandemic era. By showing how personal resilience in the face of violence is shaped by organizational support, such as reporting systems and training, the present findings move beyond individuals-level explanations, and highlight workplace violence as a systematic administrative challenge. This insight represents an important advance in current knowledge, and calls for multifaceted interventions that strengthen both personal and institutional capacity to address violence.

**Keywords:** workplace violence; nurses; resilience; emergency care; emergency department; assault; Cyprus

## 1. Introduction

Workplace violence against healthcare professionals is alarmingly prevalent worldwide, thus broadly recognized as a serious public health concern [1,2]. According to the most widely accepted definition endorsed by the International Labor Organization (ILO), the International Council of Nurses (ICN), the World Health Organization (WHO), and the Public Services International (PSI), workplace violence refers to work-related incidents of abuse, which at the same time encompasses an explicit or implicit challenge to staff's safety, well-being and health [3]. Workplace violence includes physical assaults (e.g., hitting, biting, pushing), and psychological forms such as verbal abuse, harassment, and threats [4].

According to the WHO, nearly 60% of healthcare professionals experienced some form of violence in 2022 within their work environment [5]. Yet, these incidents are under-reported, since less than 40–45% of the staff formally reports such incidents, depending on setting [6–8]. Compared to other healthcare workers, those employed in emergency department (ED) are more vulnerable to workplace violence by patients and their relatives, due to the volatile mix of emotional stress, long waits, intoxicated or unstable patients, communication breakdowns, and limited security [9–13]. A systematic review and meta-analysis estimated verbal violence prevalence against ED staff at 77% and for physical violence at 18% [9].

Indeed, systematic reviews and large-scale studies consistently highlight that ED staff experience substantially higher rates of workplace violence compared to general wards or outpatient setting employees, often reporting prevalence rates more than double than those seen in non-ED environments [9,12–14]. Among them, nurses are at even greater risk for exposure to workplace violence compared to other ED healthcare employees [15–17] due to their frontline role, direct and frequent interactions with patients and their families, and the emotional intensity of care situations [16,18]. For instance, a 2024 survey by the Emergency Nurses Association (ENA) reported that over half of ED nurses had experienced physical or verbal assault or threats within the preceding 30 days highlighting the severity of the issue [19].

Compared to private, public sector healthcare facilities are more susceptible to workplace violence incidents [20–23], mainly due to larger patient volumes and insufficient supporting resources [10,24]. Additional factors include staff shortages, overcrowding and long waiting times, high workload, high patient turnover, unpredictability of medical emergencies, and inappropriate attitudes and/or ineffective care approaches by employees [25–28].

This widespread phenomenon raises concerns due to its harmful physical, mental, psychological and organizational consequences. Affected healthcare workers often report diminished self-esteem, increased stress, burnout, poor work performance [29], absenteeism, and turnover intention [25,30]. These outcomes ultimately compromise employees' health, the quality and safety of patient care [31–36], and lead to significant financial burden for healthcare systems [37].

Yet, data on workplace violence against nurses employed in public EDs in the post-pandemic period are limited [38]. In light of the increased physical and verbal assaults, and psychological violence against ED healthcare professionals since the onset of the COVID-19 pandemic [39], further research of the issue in the post-pandemic context would be valuable. Moreover, considering that the occurrence of violence is related to culture [40], so far, studies have come from countries in North America [41–43], central Europe [6,44] and Asia [15,45,46], and seem to be limited in Eastern Mediterranean and South-Eastern European countries [12,47]. Studies from multiple cultural contexts are expected to enrich current knowledge on the topic and effectively support the creation of sustainable intervention strategies. Similarly, studies associating the impact of workplace violence with

personal characteristics, such as resilience, and professional attitudes, such as intention to quit the job, may inform targeted supportive interventions to high-risk populations.

Indeed, although most workplace violence research emphasizes preventive measures, there is also increasing attention on the factors which may mitigate its adverse effects [48]. Among these, personal resilience [49] and supportive human resource management practices stand out [50,51]. Although resilience is broadly understood as one's capacity to adapt and recover in the face of adversity [52], it mainly refers to individuals' ability to evolve and expand their competencies for sustainability after exposure to severe stress and trauma [53]. It is considered a multidimensional personality trait, encompassing adaptability, coping skills, optimism, and self-efficacy [54]. In nursing, resilience is described as a dynamic process that helps clinicians to effectively cope with the adverse effects of prolonged exposure to workplace stressors and recover, also expanding their personal and professional well-being and subsequently providing consistent quality care [55,56]. Higher resilience has been linked to lower burnout, stronger engagement with the profession, greater empathy and self-confidence, and improved clinical performance [57–62], and ultimately improved patient care [63]. Resilience has also been shown to buffer emotional exhaustion, enhance job satisfaction, and augment patient safety in frontline healthcare professionals [64].

While personal resilience highlights the importance of individual-level protective resources, outcomes of workplace violence, beyond the severity of exposure, are also shaped by the broader organizational context. According to stress and coping theoretical frameworks, at the individual level personal resilience functions as a psychological resource that enables nurses to cope with workplace stressors, minimize the depletion of emotional energy, and preserve recovery resources [65]. Beyond the individual level, resources available in the work environment also influence the impact of workplace violence, as described by the Conservation of Resources Theory [66]. This theory describes that organizational moderators, such as managerial support, effective reporting systems, and protective policies, serve as structural resources that can either amplify or mitigate the negative effects of workplace violence [67].

Differentiating these individual and structural mechanisms provides conceptual clarity and helps to explain how personal and organizational factors interact in influencing nurses' well-being, performance, and retention. Yet, despite increasing interest on the factors that may moderate the adverse effects of workplace violence, data specifically addressing the link between workplace violence and personal resilience in ED nurses remains limited [68]. According to a study conducted in 670 ED nurses in China, the importance of resilience in mitigating the adverse effects of workplace violence on them was demonstrated [69]. However, most studies on this association focus on general nursing populations [70,71] or mental health settings [49], yet these results may not be directly applicable to the emergency services context, due to possible different risk factors for workplace violence in this particular setting [49]. In addition, research on this topic from South-Eastern Europe and the Eastern Mediterranean is scarce [12,47].

Addressing the research gap on the association between workplace violence and resilience in ED nurses, the aim of the present study was to investigate the prevalence and forms of workplace violence against emergency care nurses employed in public hospitals in the RC, and to explore the relationship between workplace violence characteristics and self-perceived resilience. Findings from this study are expected to contribute to both the local and international discourse on the post-pandemic workplace violence profile, and the link with factors associated with ED nurses' well-being, such as resilience. Specifically, relevant data may be applicable both locally and across the wider European healthcare landscape in improving the quality and safety of ED nurses' work environment, factors strongly associated with professional retention and sustained engagement [28,72]. Research

on ED-related workplace violence and associations with adverse professional attitudes is expected to guide evidence-based policy reforms, institutional strategies, and preventive interventions. Such efforts are instrumental in maintaining a committed nursing workforce, thus ensuring high-quality and safe care, and equally important in promoting nurses' well-being and optimal working conditions.

### *Background*

Given the cultural context of emergency care delivery in the RC, and particularly the frequent presence of patients' relatives during treatment [73,74], as well as the absence of a targeted legislative framework addressing workplace violence, the need for localized empirical evidence becomes even more pressing. Specifically, there is no specific legislative framework dedicated to addressing workplace violence in the RC. Current protections are governed under Law 58(I)/2004 "On Equal Treatment in Employment and Work", which prohibits discrimination based on religion, belief, age, sexual orientation, gender, or nationality. This law also recognizes harassment as an act which violates a person's dignity and creates a hostile work environment [75]. These particular contextual dynamics may not only shape the frequency and nature of violent incidents but also influence the coping mechanisms employed by ED nurses.

Moreover, recent studies have highlighted how administrative and organizational factors significantly impact nurses' resilience [76,77]. Specifically, lack of perceived organizational support has been found to disempower nurses' ability to recover from workplace violence and reduce their commitment to their professional role [77]. Indeed, structural equation modeling by Tao and colleagues revealed that perceived organizational support positively influenced resilience, which in turn mediated the relationship between exposure to violence and professional identity [77]. Similarly, Huang et al. [76] found that higher self-perceived resilience scores were associated with stronger perceived organizational backing and less vulnerability to the psychological toll of workplace violence. These findings underscore the crucial role that institutional responsiveness and supportive leadership play in buffering the adverse effects of violence and sustaining resilience among emergency nurses [76].

Overall, although workplace violence against healthcare workers has been widely documented, most studies have either focused on its prevalence [9,41] or on individual coping strategies and its psychosocial and mental implications [71], in isolation. Far less is known about how resilience interacts with organizational factors—such as reporting systems, training, and institutional support—and how these dynamics influence work-related motivation and both turnover intentions and actual turnover behaviors [69,71,76,77]. Specifically, the present study aimed to (i) examine the prevalence and characteristics of workplace violence among emergency nurses in the RC, including reporting practices, organizational support, and training; and (ii) explore the associations between workplace violence, self-perceived resilience, and both turnover intentions and actual turnover behaviors, by taking into account organizational factors, such as reporting systems, support and continuing education in preventing violence. By addressing these objectives, this study contributes evidence to guide multifaceted interventions that strengthen resilience, improve organizational responses, and ultimately safeguard the emergency nursing workforce. Most importantly, by investigating these phenomena within the context of the RC, this study aims to fill a critical gap in the post-pandemic literature and offer insights that are both locally relevant and globally informative. Previous studies based on post-pandemic data come from Asia [45,77] and Spain [71]. Ultimately, the findings are anticipated to inform culturally sensitive interventions and policy recommendations, contributing to

a safer and more supportive working environment for ED nurses in the RC and similar Mediterranean healthcare systems.

## 2. Materials and Methods

### 2.1. Aim

The aim of the present study was to investigate the characteristics of workplace violence against ED nurses, and associations with self-assessed resilience, socio-demographic and vocational parameters. The following objectives were set: assessment of (i) the prevalence, characteristics and context of workplace violence, including organizational/administrative-level security strategies for managing violent incidents and reporting; (ii) the degree of self-perceived resilience; and (iii) the associations among workplace violence, self-perceived resilience, and both turnover intentions and actual turnover behaviors.

### 2.2. Research Design

The present study followed a quantitative, descriptive correlational design, structured in accordance with Stroke checklist [78].

### 2.3. Sample

The target population included all nurses working in public EDs across RC. A census sampling method was employed to ensure comprehensive coverage and achieve the required sample size, estimated at approximately 150 participants. This estimate was based on a power analysis using Cohen's statistical method and the G\*Power tool, version 3.1. [79], considering the following parameters:

- (a) The expected correlation strength  $r \approx 0.4$ , based on previous related studies [9,80];
- (b) The size of the desired statistical significance at  $\alpha = 0.05$ ;
- (c) A power index of 0.8 (80%);
- (d) The expected comparisons between approximately 20 variables.

According to data provided by the nursing administration of each hospital, the total number of eligible nurses was approximately 249. Considering an anticipated response rate of around 60%, as reported in previous studies [73], all nurses employed in the EDs of all seven public hospitals under the State Health Services Organization (SHSO) (Nicosia, Limassol, Troodos, Polis Chrysochous, Larnaca, Paphos, and Famagusta) were invited to participate.

### 2.4. Data Collection

Data collection was conducted from January to June 2024. Inclusion criteria were: (a) employment in ED for more than 12 months, a criterion relevant to the assessment tool for exposure to workplace violence, i.e., "In the last 12 months, have you experienced violence in your workplace?"; (b) comprehension of the Greek language, since the data collection tool was in Greek; (c) written informed consent. There were no additional exclusion criteria.

Recruitment was facilitated through posters hand-delivered to the heads of the EDs, each containing a QR code linking to the study questionnaire. These posters were displayed in accessible areas (e.g., noticeboards, staff kitchens, supervisors' offices), and the questionnaire could be completed at any time and place chosen by the participants. The QR code was easily scanned through a mobile phone, and the survey questionnaire through google form application. Although the QR code mode of data collection initially specified that participants should own a mobile phone, this requirement was intended only to facilitate distribution of the electronic survey link. In practice, however, both electronic and

paper-based versions of the questionnaire were provided, and no participant was excluded for lack of mobile phone access. Specifically, due to limited participation and technical issues related to QR code scanning, the research team decided to distribute in parallel a paper version of the questionnaire. The principal investigator provided verbal information during poster distribution regarding the study's purpose, confidentiality, anonymity, voluntary participation, and the right to withdraw at any time without consequence. This information was also included in the consent form, which accompanied each questionnaire. Participants were explicitly instructed not to complete both formats, i.e., printed and electronic, to prevent duplicate responses. This warning was also included in the printed questionnaires, and it was similarly orally addressed during questionnaire distribution and during reminders for participation in the study. Reminders were issued by department heads and through follow-up visits by the principal investigator.

Each electronic submission generated a notification to the main researcher's email. Upon accessing the electronic questionnaire, the informed consent page of the study was displayed. Subsequently, the participant had to either consent or withdraw. In case the participants to be consented, they were directed to the data collection questionnaire. Otherwise, the google form page was eliminated.

Similarly, each printed questionnaire was accompanied by a consent form which explained the study's aim, the voluntary nature of participation and guaranteed anonymity and confidentiality. Participants had to personally fill in the date on the consent form to confirm that they had read it and provided consensus to participate in the study. Participants' names were not recorded at any part of the questionnaire. Completed questionnaires were returned in sealed, non-transparent envelopes, and were collected in person by the main researcher (AE).

## 2.5. Instruments Description

Each questionnaire was self-reported and it comprised 3 parts: (a) demographic (gender, age), vocational (total work experience as a nurse, total work experience in the ED, ranking, work shifts, number of patients served daily in the ED, implementation of patient triage protocol, province/working hospital, availability of architectural, regulatory security measures in the ED, available ED resources for violence response, workplace violence reporting procedures) and educational (highest level of nursing education, education in communication skills, education on workplace violence management) characteristics of participants, (b) the translated in Greek and validated in the context of the RC "2016 Italian National Survey on Violence towards Emergency Nurses Questionnaire (QuIN16VIP)" for the measurement of the characteristics of workplace violence [81], and (c) the Greek version of the "Connor-Davidson Resilience Scale (CD-RISC-25)" [82] for the measurement of self-perceived degree of resilience.

The QuIN16VIP tool was developed by Ramacciati et al. [81]. It is a self-administered questionnaire developed specifically to investigate workplace violence among emergency nurses. It consists of 39 items and 10 sub-items using closed-ended or multiple-choice questions in the form of a checklist, as well as one open-ended question calling the participants to briefly describe their perception of workplace violence. The following dimensions of workplace violence are explored: exposure to violence, perpetrator characteristics, direct effects of violent acts, violence reporting systems, specific training on violence management, and consequences of violent acts. The mean completion time of the tool is 14 min. A test-retest reliability score measured by the Cohen-Fleiss K coefficient was 0.71 [81].

The Greek version of the CD-RISC-25 consists of 25 items, which assess individuals' perceptions on their ability to cope with and/or recover from challenging experiences over the past month [82,83]. Each item is rated on a Likert scale from 0 (Not at all true)

to 4 (Almost always true), with a cumulative score based on the sum of all items, ranging from 0 to 100. The higher the score the higher degree of self-perceived resilience. The CD-RISC-25 tool has been shown to have high internal consistency reliability (Cronbach's  $\alpha = 0.925$ ) as well as test-retest reliability (intra-class correlation coefficient = 0.925). Adequate construct validity based on exploratory factor analysis and convergent validity, through correlation with other tools, have also been confirmed for the Greek version of the tool [83].

## 2.6. Cultural Adaptation

Cultural adaptation was conducted solely for the QuIN16VIP tool, as the CD-RISC-25 had already been translated and validated in the Greek language [83]. The QuIN16VIP was initially translated from English into Greek and then back translated into English by a team of four experts. This team included the principal researcher (AE), who was a postgraduate student in Advanced Nursing Practice, and three bilingual academics with backgrounds in social, health, or basic sciences, all of whom had prior experience in instrument translation and adaptation. The expert panel compared the translated version with the original questionnaire and held discussions to resolve any discrepancies related to wording, phrasing, and conceptual meaning, aiming to reach consensus on the final Greek version. A second independent back-translation was conducted to ensure consistency and equivalence. Subsequently, one expert from the translation team conducted an independent review of both the Greek and original English versions to confirm linguistic accuracy and cultural appropriateness. Based on this feedback, and following a final review by the research team, the translated version was deemed ready for use in the next phase of the study.

During the pilot test of the Greek version of the questionnaire, interviews with 6 registered nurses were carried out by a member of the expert group, aiming to assess questionnaire's readability and comprehension of individual items. During the interviews, participants were asked to provide in-depth insights on the content of each item of the questionnaire to ensure that all questions and response options were clear and easy to understand (face validity), and well-adapted to the local language, cultural context, and healthcare system. Detected errors/misunderstandings identified were minimal, making any changes unnecessary. These six nurses were excluded from the study's sample.

## 2.7. Ethical Issues

Permission to conduct the study was obtained from the Cyprus National Bioethics Committee (CNBC) (EEBK.EII 2023.01.251) and the Research and Innovation Office of the SHSO in order to conduct the study in relevant hospitals. The Scientific/Medical Directors of the hospitals, the Executive Directors of the Divisions and the Heads of Departments were informed about the purpose of the study and received the research protocol. Authorization to access the public EDs was also obtained from the head of each setting. The heads of the EDs and employed nurses were informed verbally by the principal researcher (AE) during the distribution of the posters about the purpose of the research, anonymity, safeguarding the confidentiality of information, and the right to withdraw from the study at any time during the completion of the questionnaire, with absolutely no repercussions being confirmed.

Electronic informed consent was obtained, where participants were informed of their rights on the home page of the link, and after giving their consent, they could proceed with completing the questionnaire. The consent form noted the purpose of the research, the voluntary nature of participation, the preservation of anonymity, the confidentiality of the information, since only the research team would have access to it, and the right to withdraw

from the study at any stage, and that no personal data will be requested at all, except for some basic demographic information, specifically years of professional experience, age, gender, highest level of education, etc. Participants had the right to discontinue their participation at any time, without any consequences. After the questionnaires were electronically sent or received by the principal researcher (AE), it was not possible to cancel participation due to anonymization. Participants were asked to complete the questionnaire only once. This information was included in the consent form. The contact details of the principal researcher (AE) in case participants had any questions about the questionnaire or the procedure were also written on the consent form. The principal researcher (AE) received a notification to her personal email address for each completion of an electronic questionnaire. The data were sent directly to the personal account of the principal researcher (AE). Furthermore, the computerization of the data was carried out exclusively by the principal researcher (AE) with complete confidentiality. Only the principal investigator (AE) and the study research team had access to the data.

Permission to use the questionnaires was obtained by each developer.

## 2.8. Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics (version 25, IBM Corp., Armonk, NY, USA). Descriptive statistics, such as frequencies, % percentages, mean value and standard deviation [M(SD)] scores, were calculated to describe the demographic and study-specific variables. The distribution of variables was checked for normality and parametric tests were applied accordingly. To examine differences in resilience scores across categorical variables, independent samples *t*-tests were used for comparisons between two groups, while one-way analysis of variance (ANOVA) was conducted for variables with more than two groups. Post hoc tests were applied appropriately to identify specific group differences. In addition, a series of binary logistic regression models were conducted to investigate the relationship between exposure to workplace violence, perceived organizational support, participation in communication programs, and self-perceived resilience, using the Forward method: Likelihood Ratio. The dependent (outcome) variables included (a) consider leaving the nursing profession, (b) consider moving to a different work setting, and (c) actually applying to be transferred to a different work setting. The Forward Likelihood Ratio stepwise method was chosen to identify the most parsimonious set of predictors associated with the outcome variables, given the exploratory nature of this study and the relatively large number of candidate variables. While stepwise procedures are not without limitations, they are commonly used in exploratory contexts to reduce model complexity and highlight variables of greatest predictive value.

For the CD-RISC-25 tool, scores were interpreted with a median and quartiles. The quartiles describe four equal groups taken from the observed distribution of scores, with the first quartile (Q1) describing the range of scores for the lowest group (lowest 25% of the population), which is the least resilient, the second (Q2) and third (Q3) are the intermediate scores and the fourth (Q4) describes the highest or most resilient group, in the top 25% and above 75% of the population. The significance level was set at  $\alpha = 0.05$ , and all tests were two-tailed. Regarding missing values for the CD-RISC-25 tool, missing responses were scored using the average of the other items. For the scale to be considered valid, at least 75% (19 items) had to be completed. Anything less than this was considered an invalid assessment.

Since the QuINVIP16 instrument is structured as a checklist, in which respondents indicate the presence or absence of specific types/characteristics of violent incidents, the validity of the instrument has been established through prior applications in similar

healthcare contexts and was further supported in the present study by a systematic cultural adaptation process, as described above.

An open-ended question was included at the end of the questionnaire to enable participants to elaborate on their earlier responses or to express additional thoughts and personal reflections on workplace violence. The responses were analyzed using descriptive content analysis. Initially, all textual data were reviewed to identify recurring concepts and meaningful segments. Responses were then grouped into thematic categories based on the content and context of participants' statements. The relative frequency of comments within each category was calculated and expressed as percentages to identify the most prevalent themes.

### 3. Results

#### 3.1. Demographic, Vocational and Educational Characteristics of Participants

A total of 132 out of 249 nurses of the target population participated in the study, yielding a response rate of 53.0%. The mean age (SD) of participants was 38.7 (8.6), years and the majority were female (58.3%). Participants reported an average of 15.5 (8.5) years of total nursing experience, and 9.6(8.4) years of experience in an ED setting. Most participants were staff nurses (93.2%), working on rotating shift (92.4%), and their higher education was a bachelor's degree in nursing (62.1%). The largest proportion of participants worked in Nicosia General Hospital (22.7%). Most participants indicated that a patient triage protocol existed in their work setting (92.4%), with 59.8% stating that this was almost always implemented. However, the majority had never attended educational courses on communication skills (55.3%) or on workplace violence management (68.9%) (please see Table 1).

**Table 1.** Demographic, vocational and educational characteristics of participants (N = 132).

| A. Numeric Variables                                                           | Mean Value (Standard Deviation) |
|--------------------------------------------------------------------------------|---------------------------------|
| Age (years)                                                                    | 38.7 (8.6)                      |
| Total work experience as a nurse (years)                                       | 15.5 (8.5)                      |
| Total work experience in an ED (years)                                         | 9.6 (8.4)                       |
| B. Categorical variables                                                       | % Percentage                    |
| <b>Sex</b>                                                                     |                                 |
| Male                                                                           | 40.9                            |
| Female                                                                         | 58.3                            |
| <b>Higher level of education</b>                                               |                                 |
| Bachelor's degree in Nursing or Nursing diploma                                | 62.1                            |
| Master's degree                                                                | 33.3                            |
| Doctoral degree or Other                                                       | 4.5                             |
| <b>Ranking</b>                                                                 |                                 |
| Registered Nurse                                                               | 93.2                            |
| Head of Department                                                             | 6.8                             |
| <b>Work shifts</b>                                                             |                                 |
| Round the clock shift                                                          | 92.4                            |
| Morning shift                                                                  | 7.6                             |
| <b>Number of participants who have responded from each work hospital</b>       |                                 |
| Hospital A & B                                                                 | 25.7                            |
| Hospital C                                                                     | 22.7                            |
| Hospital D & E                                                                 | 28.8                            |
| Hospital F & G                                                                 | 22.8                            |
| <b>Number of patients treated daily in the ED, as reported by participants</b> |                                 |
| Up to 50 people                                                                | 37.1                            |
| Up to 100 people                                                               | 25.8                            |
| Up to 150 people                                                               | 26.5                            |
| More than 150 people                                                           | 10.6                            |

Table 1. Cont.

| A. Numeric Variables                                                                             | Mean Value (Standard Deviation) |
|--------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Implementation of a patient triage protocol</b>                                               |                                 |
| Sometimes to almost never                                                                        | 12.9                            |
| Most of the time                                                                                 | 27.3                            |
| Almost always                                                                                    | 59.8                            |
| <b>Attendance of educational courses on communication</b>                                        |                                 |
| Regularly (every 2–3 years)                                                                      | 9.1                             |
| Occasionally (>4–5 years)                                                                        | 34.1                            |
| Never                                                                                            | 55.3                            |
| <b>Attendance of educational courses for healthcare workers on workplace violence management</b> |                                 |
| Regularly (every 2–3 years)                                                                      | 4.5                             |
| Occasionally (>4–5 years)                                                                        | 24.2                            |
| Never                                                                                            | 68.9                            |

ED: Emergency Department.

### 3.2. Characteristics and Context of Workplace Violence and Organizational/Administrative-Level Security Strategies for Managing Violent Incidents

There were no statistically significant associations between socio-demographic factors and violence-related variables.

#### 3.2.1. Characteristics of Workplace Violence

Approximately 92.4% of participants reported experiences of verbal violence in the last 12 months, while 16.7% reported experiences of both verbal and physical violence (please see Table 2).

Table 2. Percentage (%) of verbal and physical violence incidents reported by participants (N = 132).

| Variables                                                        | Verbal Violence (%) * | Physical Violence (%) * |
|------------------------------------------------------------------|-----------------------|-------------------------|
| <b>Exposure to violence</b>                                      |                       |                         |
| Yes                                                              | 92.4                  | 23.5                    |
| No                                                               | 7.6                   | 76.5                    |
| <b>Absence from the workplace due to an incident of violence</b> |                       |                         |
| Yes                                                              | 3.0                   | 0.8                     |
| No                                                               | 78.0                  | 22.7                    |
| <b>Number of incidents of verbal violence</b>                    |                       |                         |
| <20 episodes                                                     | 75.0                  | -                       |
| ≥20 episodes                                                     | 9.8                   | -                       |
| <b>Number of incidents of physical violence</b>                  |                       |                         |
| <2                                                               | -                     | 13.6                    |
| >2                                                               | -                     | 3.1                     |

\* Multiple answers possible; percentages may exceed 100%.

Inappropriate behavior (84.1%), insult/deprecation/disrespect (62.1%) and screaming/shouting/high volume of voice (48.5%) were the most common forms of verbal violence. The most frequently reported physical violence behaviors were pushing (9.8%), pulling/grasping (6.1%), and spitting (4.5%). Armed threats with real or hand-held weapons were limited to three incidents, with one stabbing incident reported. The arm/forearm (6.1%) and hand/palm (5.3%) were the most commonly injured body parts, mainly due to scratches/abrasions (7.6%) and exposure to liquids (3.8%) (please see Table S1).

#### 3.2.2. Characteristics of Perpetrators

Patients and their escorts—both at the same time—were the most frequently reported perpetrators (32.6%), followed by patients' escorts-solely (18.2%), and patients themselves-

solely (17.4%). Long waiting times (45.5%), overcrowding in the ED (35.6%) and feelings of inattention from healthcare professionals (20.5%) were the main triggers for violent behaviors by ED service users reported by the participants. Among clinical conditions, patients' intoxication (29.5%) and confusion/agitation/anxiety (26.5%) were the most frequently reported risks for aggressive or violent behavior by them. Most of the violence-related incidents took place during assessment and physical examination (39.4%). Consequently, the triage area (37.1%) and examination rooms (30.3%) were the places where violent episodes occurred most frequently (please see Tables 3 and S1).

**Table 3.** Characteristics of perpetrators, the context of incidents and organizational/administrative-level security strategies for managing violent incidents (N = 132).

| Variables                                                 | Responses                                             | % *    |
|-----------------------------------------------------------|-------------------------------------------------------|--------|
| <b>Perpetrator</b>                                        | Patient solely                                        | 17.4   |
|                                                           | Patients' escorts solely                              | 18.2   |
|                                                           | Both at the same time patients & their escorts        | 32.6   |
| <b>Clinical condition of perpetrator</b>                  | Dementia/Psychiatric disorder/Agitated                | 60.6 † |
|                                                           | Head injury/Substance use/Withdrawal syndrome         | 62.1 † |
|                                                           | Other/Unspecified                                     | 23.5   |
| <b>Contextual factors/triggers of violent behavior</b>    | Long wait/Crowded ED                                  | 81.1 † |
|                                                           | Complaints for unattendance                           | 33.3 † |
|                                                           | Nothing in particular/Other                           | 13.7   |
| <b>Resources &amp; strategies for violence management</b> | Staff/Security/Police presence                        | 88.6 † |
|                                                           | No support/Nothing                                    | 6.8    |
| <b>Security service availability</b>                      | 24/7 access                                           | 56.8   |
|                                                           | Daytime only                                          | 19.7   |
| <b>Security measures in the ED</b>                        | ED entry checks/Access restrictions/Enclosed stations | 31.8   |
|                                                           | CCTV/Alarm bells/Panic buttons/Code systems           | 31.8   |
|                                                           | Lighting/Room locks/Secure exits                      | 34.8   |
|                                                           | TVs/Food dispensers/Music/Multilingual info           | 22.7   |
|                                                           | Zero-tolerance signs/Visitor ID/pass                  | 3.8    |
|                                                           | No measures reported                                  | 31.8   |

\* Multiple answers possible; percentages may exceed 100%. † Some categories include multiple combined items for brevity. CCTV: Closed-Circuit Television; ED: Emergency Department; ID: Identity Document; TV: Television.

Intervention by a peer (29.5%), the security/police service (29.5%), or the participant alone trying to manage the violent behavior (27.3%) were the most common ways of managing these incidents (please see Table 3). Regarding the available architectural, regulatory, and administrative security measures available in the ED, approximately one in three participants (31.8%) reported lack of any such measures. One out of five mentioned a closed-circuit surveillance system (19.7%) and adequate lighting throughout the ED (18.2%). Overall, architectural, regulatory, and administrative safety measures were described as inadequate (please see Tables 3 and S1).

### 3.3. Reporting Systems

Regarding systems and procedures for reporting violent incidents, approximately one-third of participants (32.6%) stated that they were unaware of the hospital's availability of violence incident reporting procedures/systems, while one out of four (22.7%) reported a lack of violence incident reporting procedures/systems.

Reporting of violent incidents took place mostly verbally (63.6%), while only one out of six proceeded to a formal written report (16.7%). Indeed, a specific violent reporting form was completed by the vast minority of the participants, while one out of six did not report at all (15.9%) (please see Tables 3, 4 and S1). Regarding the person to whom the reporting took place, this was the shift supervisor (62.1%), a peer (37.9%) or the head of the ED (34.1%).

**Table 4.** Reporting systems for workplace violence incidents described by the participants (N = 132).

| Variables                                               | Responses                                                            | % *     |
|---------------------------------------------------------|----------------------------------------------------------------------|---------|
| Incident reporting reference person                     | Peer/Shift supervisor/Head of ED/Nurse manager                       | 139.4 * |
|                                                         | Physician on duty                                                    | 15.9    |
|                                                         | Security service/Police                                              | 31.1    |
|                                                         | Risk-safety/SHSO/National violence registry/Workplace safety service | 6.1     |
|                                                         | Not mentioned                                                        | 8.3     |
| Reporting form                                          | Verbal (including informal reporting)                                | 63.6    |
|                                                         | Written (including incident forms)                                   | 28.0    |
|                                                         | No report                                                            | 15.9    |
| Availability of reporting procedures                    | Yes                                                                  | 40.9    |
|                                                         | No                                                                   | 22.7    |
|                                                         | "I don't know" response                                              | 32.6    |
| Responsible for violence management person/organization | Unclear/Unknown                                                      | 55.3    |
|                                                         | Nursing staff member                                                 | 13.6    |
|                                                         | Head of ED/Nurse manager                                             | 47.0    |
|                                                         | H&S supervisor/State occupational H&S agency/Other                   | 11.4    |

\* Multiple answers possible; percentages may exceed 100%. ED: Emergency Department; H&S: Health & Safety; SHSO: State Health Services Organization.

### 3.4. Self-Perceived Resilience Scores

Based on a distribution in quartiles, almost one in two participants demonstrated moderate to high mean scores (SD) of self-perceived resilience [54.25(15.0)–73.75(15.0)] and 25% of them reported a very high score of self-perceived resilience, specifically a mean value higher than 73.

#### Association Between Self-Perceived Resilience Scores and Professional Attitudes After Exposure to Workplace Violence

Participants who reported that exposure to workplace violence decreased “quite a lot to a lot” their work-related motivation presented statistically significantly lower self-perceived resilience scores [M(SD): 58.7(14.6)] compared to those who stated “very little to not at all” impact on motivation [M(SD): 66.5(13.8)] (*t*-test,  $p = 0.005$ ). Participants who “very often to every time” considered moving from the ED to a different work setting after a workplace violent experience also reported lower self-perceived resilience scores than those who “rarely or never” considered such a move (ANOVA, mean difference = 8.37,  $p = 0.040$ ). Similarly, participants who actually applied for a transfer to a different work setting

due to experiences of workplace violence showed lower self-perceived resilience scores [M(SD): 52.1(13.4)] compared to those who did not request transfer [M(SD): 65.5(14.4)] ( $t$ -test,  $p < 0.001$ ). In line with the above, self-perceived resilience scores were significantly lower among participants who “very often to every time” considered leaving the nursing profession after a workplace violence experience compared to those who “rarely to never” considered leaving the nursing profession (ANOVA, mean difference = 12.65,  $p = 0.007$ ). No associations were found between decreased job satisfaction due to workplace violence exposure and self-perceived resilience scores ( $p = 0.154$ ). Differences in self-perceived resilience mean scores in relation to workplace violence exposure variables are presented in Table S2.

### 3.5. Factors Related to Turnover Intention

The association between factors related to turnover intention are presented in Figure S1.

#### 3.5.1. Model 1: Considering Leaving the Nursing Profession

Participants who considered that their work motivation decreased “quite a lot to very much” after exposure to workplace violence were approximately 80 times more likely to consider leaving the nursing profession compared to those whose work motivation decreased “very little or not at all” [OR (95%CI): 79.14(17.73–353.18);  $p < 0.001$ ]. Similarly, individuals who had not attended communication training courses/programs were about 4 times more likely to consider leaving the nursing profession after exposure to workplace violence than those who had attended such education [OR (95%CI): 4.19(1.08–16.24);  $p = 0.038$ ].

No other variables (gender, age, province, education level, form of workplace violence experience, self-perceived resilience, workload) were statistically significantly associated with intention to leave the nursing profession ( $p > 0.05$ ) (please see Table 5).

**Table 5.** Logistic regression analyses examining factors associated with intentions to change work setting or leave the nursing profession among nurses exposed to workplace violence.

| Variables                                                                             | Responses                | %    | Odds Ratio | Two-Tailed<br><i>p</i> -Value | 95% Confidence Interval |            |
|---------------------------------------------------------------------------------------|--------------------------|------|------------|-------------------------------|-------------------------|------------|
|                                                                                       |                          |      |            |                               | Lower End               | Higher End |
| Model 3. Actual application to be transferred from the ED to a different work setting |                          |      |            |                               |                         |            |
| Physical violence experience                                                          | Yes                      | 22.7 | 0.20       | 0.039                         | 0.05                    | 0.92       |
| Work-related motivation decrease due to workplace violence experience                 | Quite a lot to very much | 30.3 | 19.64      | <0.001                        | 4.22                    | 91.46      |
| Overall resilience score                                                              |                          | 97.0 | 0.94       | 0.006                         | 0.90                    | 0.98       |
| Model 2. Considering transferring to a different work setting                         |                          |      |            |                               |                         |            |
| Work-related motivation decrease due to workplace violence experience                 | Quite a lot to very much | 30.3 | 16.97      | <0.001                        | 3.78                    | 76.15      |
| Model 1. Considering leaving the nursing profession                                   |                          |      |            |                               |                         |            |
| Work-related motivation decrease due to workplace violence experience                 | Quite a lot to very much | 30.3 | 79.14      | <0.001                        | 17.73                   | 353.18     |
| Attendance of communication courses                                                   | No                       | 55.3 | 4.19       | 0.038                         | 1.08                    | 16.24      |

#### 3.5.2. Model 2: Considering Transferring to a Different Work Setting

The only predictive factor that entered the final statistical model regarding intention to move to a different work setting was decreased work motivation. Specifically, participants who reported “quite a bit to a lot” decrease in work motivation after workplace violence

experience were approximately 17 times more likely to consider changing work setting compared to those who reported “very little or no” decrease [OR (95%CI): 16.97(3.78–76.15);  $p < 0.001$ ] (please see Table 5).

### 3.5.3. Model 3: Actual Application to Be Transferred from the ED to a Different Work Setting

A decrease in work motivation was the strongest predictor of actual turnover behavior following exposure to workplace violence.

Although self-perceived resilience was not directly linked to considering leaving the nursing profession or moving to a different work setting, it was significantly associated with actual application for a transfer to a different work setting. Specifically, each one-point increase in self-perceived resilience score resulted in a 9.4% decrease in the likelihood of requesting a transfer after exposure to workplace violence [OR (95%CI): 0.9(0.9–1.0);  $p = 0.006$ ] (please see Table S3).

### 3.6. Open-Ended Question

Participants were invited to provide additional comments or reflections on workplace violence through an open-ended question included at the end of the questionnaire (please see Table 6). A recurring concern was the need for enhanced security measures, including continuous police presence, surveillance systems, and safer physical infrastructure within EDs. Several participants emphasized the importance of legal enforcement, including criminal prosecution and stricter visitor regulations. Others highlighted the lack of managerial support and the need for psychological assistance and structure debriefing. Additional recommendations included training programs to help nurses manage violent situation, while a few participants pointed to broader societal issues, such as limited public respect and awareness of the nursing role. Collectively, these responses reflect the multifaceted nature of workplace violence and underscore the need for coordinated, system-wide interventions.

**Table 6.** Content analysis of open-ended question on workplace violence towards ED nurses.

| Categories                                       | Codes                                                                                      | % *  |
|--------------------------------------------------|--------------------------------------------------------------------------------------------|------|
| Exposure to violence and workplace vulnerability | Routine exposure to violence, vulnerable working conditions, lack of public awareness      | 32.1 |
| Social issues and lack of public respect         | Perceptions of cultural disrespect, Normalization of verbal abuse                          | 7.1  |
| Training and education needs                     | Requests for workshops, experiential programs                                              | 10.7 |
| Security measures and environmental design       | Calls for security presence, Infrastructure improvements, cameras, exits                   | 35.7 |
| Legal protection and enforcement                 | Suggestions for criminal prosecution, stricter enforcement, control of escorts             | 21.4 |
| Managerial support and mental health services    | Lack of support systems, Need for psychological help<br>Need for managerial responsibility | 17.9 |

\* Some responses were multi-thematic and coded under more than one category.

## 4. Discussion

This study explored the multifaceted issue of workplace violence in ED nurses in the RC, with a particular focus on its associations to nurses’ self-perceived resilience, socio-demographic and vocational parameters. The present findings highlighted the pivotal role

of self-perceived resilience in mitigating adverse emotional and professional consequences of workplace violence exposure, with higher resilience scores being associated with lower perceived impact on work motivation and turnover behavior, thus greater capacity to cope with violent incidents in the workplace. While these findings confirmed that resilience is associated with turnover behavior, interpreting resilient attitude solely as an individual characteristic risks oversimplifying the phenomenon. In contrast, the present findings also underscored interacting organizational factors with turnover attitudes, such as the lack of training opportunities and decreased work motivation which may constrain resilient behaviors and trigger the intention to leave the nursing profession. This suggests that resilient behaviors and turnover intention should not be understood in isolation, but rather as a dynamic process shaped mainly by institutional conditions. From this perspective, strategies to reduce turnover intention must extend beyond individual-level interventions, such as stress management or coping skills training, and address organizational responsibilities, including the establishment of supportive reporting mechanisms, training in violence prevention, and broader institutional commitments to workplace safety, to enhance work-related motivation and allow resilient behaviors to flourish.

Overall, this study makes a novel contribution by simultaneously examining the prevalence and reporting of workplace violence, its organizational context, and its relationship with resilience and turnover among emergency nurses in the RC. While previous research has primarily emphasized either the prevalence of violence [45,47], the individual coping strategies and resilience of healthcare workers [71], or institutional support [69,76,77] our findings integrated both perspectives, demonstrating how resilience interacts with institutional support, organizational factors, and turnover attitudes within the context of exposure to workplace violence. To our knowledge, this is the first post-pandemic study in the Mediterranean region to provide empirical quantitative evidence on the link between exposure to workplace violence, resilience, turnover intentions and actual turnover behaviors, thereby offering new insights into how workplace violence translates into workforce instability in the post-pandemic period. By situating resilience within its broader organizational context, the study provides advanced understanding of workplace violence as both an individual and systemic challenge, underscoring the need for multifaceted post-pandemic interventions.

#### *4.1. Workplace Violence Characteristics*

Regarding violent phenomena, high rates of verbal violence were indicated, consistent with global findings [12,84,85]. However, the prevalence observed was notably higher than global averages reported in meta-analyses [12] and aligned with earlier findings from Cyprus [73]. These discrepancies may partly be attributed to underreporting, a common issue in workplace violence research [12,73]. Indeed, incidents in this study were often reported verbally, primarily to peers or shift supervisors, and rarely escalated to formal documentation. This pattern may be influenced by the perceived normalization of violence in ED work environment, limited awareness of formal reporting systems, and inadequate security measures, all of which likely discourage proper reporting and complicate prevention and management efforts.

Although international literature identified socio-demographic and occupational risk factors, including age, gender, work experience, and shift patterns [12,85], no significant associations were found in this study. This might be explained by gender imbalance in the sample, limiting the statistical power for certain comparisons. Previous studies have reported that younger, less experienced healthcare workers, and those working long or night shifts, were at greater risk of being exposed to violence [84]. Discrepancies may reflect

contextual and methodological differences across studies, such as sample composition and healthcare system structures.

Violence was predominantly perpetrated by patients and their companions, often influenced by clinical and environmental stressors such as intoxication, mental health disturbances, overcrowding, and long waiting times [73,84]. The triage area and examination rooms were identified as the highest-risk locations, reflecting the vulnerability of frontline spaces where patient emotions often run high. Insufficient security infrastructure exacerbated this risk, with one-third of participants reporting no security measures in place. This highlighted the need for architectural, regulatory, and administrative safeguards, such as locked doors, metal detectors, clear signage, bright lighting, and transparent workspace designs [27].

A notable finding was the high proportion of participants who had never attended training programs on communication or workplace violence management. The present open-ended responses emphasized the need for targeted educational opportunities. Structured and ongoing training in de-escalation techniques, communication skills, and violence prevention strategies has been shown to improve management of aggressive behavior [86,87], underscoring the importance of integrating such programs into professional development initiatives.

#### *4.2. Workplace Violence and Self-Perceived Resilience*

The present study documented a clear association between workplace violence exposure, self-perceived resilience, work motivation and turnover attitudes in ED nurses. Specifically, the majority reported moderate resilience, with a quarter scoring very high, while those with lower resilience reported greater decrease in work motivation. In fact, participants experiencing substantial decrease in motivation were nearly 80 times more likely to consider leaving the profession and more likely to seek a transfer to a different work setting. Most importantly, participants with higher self-perceived resilience were significantly less likely to request a transfer to a different work setting after experiencing workplace violence. These findings support the notion that resilience may be a protective factor against emotional exhaustion and loss of motivation following workplace adversity for emergency nurses, as previously suggested [57,85,88–92].

Surprisingly, self-perceived resilience was not associated with job satisfaction decrease following workplace violence exposure, suggesting that job satisfaction may depend on broader factors, such as organizational culture, management style, professional recognition and status, welfare and salary, and promotion opportunities [57,93]. While resilience helps maintain emotional balance, it may not buffer against dissatisfaction arising from systemic or structural workplace issues. Thus, efforts to strengthen resilience should be accompanied by organizational reforms to improve professional outcomes [57,94,95].

Regarding the type of violence experienced, no differences in resilience scores were observed between those exposed to verbal and/or physical violence and those unexposed, suggesting that resilience is a personal trait not directly influenced by isolated violent episodes [96]. Nevertheless, organizational support has been shown to enhance resilience independently of the degree of exposure to violence [97,98]. Indeed, the participants who reported the existence of formal reporting systems exhibited higher resilience scores than those without. This suggests that institutional structures may reinforce individual resilience, possibly by fostering security and trust [99–101]. Consistent with prior research, resilience is a modifiable trait that can be strengthened through targeted interventions, such as communication skills and de-escalation interventions training [49,53]. Indeed, the participants who had attended communication training were four times less likely to

consider leaving the nursing profession after workplace violence exposure, emphasizing the protective role of resilience, also confirming previous data [102,103].

Overall, the present findings underscore the importance of incorporating resilience-enhancing interventions into nursing education and ongoing professional development. Programs focusing on conflict resolution, de-escalation strategies, and emotional regulation are expected to prevent escalation during violent encounters and strengthen nurses' capacity to recover from such events [86,87]. Based on previous data, resilience seems to buffer the emotional and professional impact of violence; nurses with higher resilience reported greater emotional stability, reduced moral distress, increased job satisfaction [104,105], improved professional performance, stronger sense of purpose and work engagement [85].

#### *4.3. Study Limitations and Related Implications for Future Studies*

Despite the novelty of the present study, its cross-sectional design does not allow for causal inferences to be drawn between workplace violence, resilience, and turnover intention. While significant associations were identified, the temporal sequence of these relationships cannot be determined. Future longitudinal research is therefore needed to clarify potential causal mechanisms and better capture changes over time. Similarly, a limitation of the analytical approach was the use of the Forward Likelihood Ratio stepwise logistic regression method. Stepwise procedures have been criticized for potential inflation of Type I error rates, instability across samples, and reliance on statistical criteria rather than theoretical frameworks. The decision to use this method was based on the exploratory aim of identifying key predictors among multiple demographic and vocational factors, and the need to avoid overfitting. Nevertheless, results should be interpreted with caution, and future studies should seek to validate these findings using hierarchical or theory-driven modeling strategies.

Additionally, while this study employed a census sampling approach to maximize representativeness, the response rate of 53%, although effective, may limit the generalizability of the findings in different settings. Furthermore, the voluntary nature of the sampling introduces the potential for self-selection bias. Specifically, it is possible that nurses who had personally experienced workplace violence were more motivated to respond, whereas those who had not encountered such incidents may have been less inclined to participate. Conversely, some nurses with highly distressing experiences may have chosen not to respond due to discomfort in revisiting those events. These potential differences between respondents and non-respondents limit the ability to assume that the findings fully represent the perspectives of all emergency nurses in the target population. As a result, the generalizability of the study should be interpreted with caution, particularly when extrapolating to wider emergency nursing populations or other healthcare settings. Yet, according to anecdotal data of the Cyprus Nurses and Midwifery Association, the demographic, educational and personal data of the participants are similar to those reported by the participants, herein. Future research employing strategies to improve response rates and selection bias, such as mixed-method recruitment or follow-up reminders, may help reduce the impact of nonresponse bias and strengthen external validity of the reported data.

Another limitation relates to the measurement instrument. The QuINVIP16 is a structured checklist rather than a Likert-type scale. As such, conventional psychometric indices of internal consistency (e.g., Cronbach's alpha) are not applicable [79]. Yet, the instrument has undergone cultural adaptation herein, while it has been used in previous research in its current form. Future studies would benefit from further psychometric evaluation of the instrument, such as test-retest stability or item-level analyses, which are expected to strengthen the evidence base for their use in diverse settings. In addition, collecting retrospective self-reported data may have introduced recall and reporting bias,

potentially affecting the accuracy of responses. Future studies could reduce relevant limitations by incorporating prospective data collection through longitudinal cohort studies, using, for example, diary methods for data collection, or even by validating self-reports against objective records where available, or through mixed methods study designs. An alternative method would be the shortening of recall period by limiting the time frame participants are asked to recall, e.g., “in the past week” rather than “in the past year”, aiming to reduce memory distortion. Phrasing questions in standardized, well-tested questionnaires clearly is an important way to reduce ambiguity and make it easier for participants to recall accurately. Reporting bias may also have been present if participants selectively disclosed or withheld information; to address this, future research could emphasize anonymity and confidentiality more strongly, or include cross-checks with secondary data sources, e.g., personal diaries or digital activity blogs. Finally, estimation bias could have arisen from duplicate questionnaire submissions, whether in electronic or paper format. Although participants were explicitly reminded on two occasions to complete the survey only once, future studies could strengthen this safeguard by using unique identifiers or technical restrictions to prevent multiple entries.

Nevertheless, this study highlighted the need for further research on quality and safety improvement initiatives, particularly those aimed at strengthening organizational structures and motivation in the work environment. Future longitudinal and prospective studies are needed to investigate all aspects of the phenomenon, clarify the causal mechanisms of aggressive behavior, identify protective factors, and develop effective strategies to address violence against healthcare professionals. Specifically, in addition to resilience, other psychological processes may play a critical role in shaping healthcare professionals’ well-being and professional attitudes in high-stress environments, which need to be addressed in future studies. For instance, recent research with Italian ICU nurses during the COVID-19 pandemic has shown that difficulties in emotion regulation and psychological inflexibility significantly contribute to perceived stress, with effects that may be moderated by work experience [106]. These findings suggest that resilience should be considered alongside complementary mechanisms, as they are likely to interact in complex ways to influence how nurses cope with workplace violence and other occupational stressors. Thus, future studies need to include relevant psychological processes and broader theoretical frameworks.

A further limitation is that our models included only selected demographic and vocational characteristics. Other important contextual and organizational factors, such as nurse-to-patient staffing ratios, length and scheduling of shifts, prior experiences of trauma, were not measured. These unmeasured variables may also play a role in shaping both resilience and turnover intention among emergency nurses exposed to workplace violence. Future studies should incorporate such organizational and personal factors to provide a more comprehensive understanding of the determinants of resilience and workforce sustainability in high-risk emergency settings.

Moreover, our study did not assess Nursing-Sensitive Outcomes (NSOs), such as patient safety indicators (e.g., falls, medication errors, pressure injuries), which may also be affected by nurses’ exposure to workplace violence. Our focus was restricted to outcomes experienced by nurses themselves, including turnover attitudes. Future studies should examine whether and how patient-related outcomes are influenced by nurses’ exposure to violence in the ED, as this may provide a more comprehensive understanding of the broader impact of such incidents.

## 5. Conclusions

Verbal violence is the most common form experienced by ED nurses, mainly perpetrated by patients and companions. Clinical factors, long waiting times, and inadequate

security measures contribute to the problem. Underreporting and lack of formal reporting systems further complicate management. Multilevel interventions are needed to prevent, address, and support staff facing workplace violence. The study emphasizes the critical role of both personal resilience and organizational support mechanisms in mitigating the negative impacts of workplace violence among ED nurses. While resilience contributes to emotional stability and reduces professional disengagement, findings underline the complex relationship between personal resources such as resilience, organizational supportive structures and professional outcomes, suggesting that interventions aimed solely at strengthening individual resilience may not be enough to preserve job satisfaction or prevent turnover intentions unless accompanied by organizational changes and motivation enhancement.

**Supplementary Materials:** The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/healthcare13202562/s1>. Figure S1: Predictors of turnover attitudes among participants exposed to workplace violence; Table S1: Characteristics of verbal and physical violence; Table S2: Logistic regression analysis of associated factors of exposure to workplace violence; Table S3: Results of logistic regression analyses examining factors associated with intentions to change work setting or leave the nursing profession among participants exposed to workplace violence.

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## Abbreviations

The following abbreviations are used in this manuscript:

|          |                                            |
|----------|--------------------------------------------|
| ACEP     | American College of Emergency Physicians   |
| APA      | American Psychological Association         |
| CCTV     | Closed-Circuit Television                  |
| CDC      | Centers for Disease Control and Prevention |
| CD-RISC  | Connor-Davidson Resilience Scale           |
| CI       | Confidence Interval                        |
| CNBC     | Cyprus National Bioethics Committee        |
| COVID-19 | Coronavirus Disease 2019                   |
| ED       | Emergency Department                       |
| H&S      | Health & Safety                            |

|           |                                                                                     |
|-----------|-------------------------------------------------------------------------------------|
| ICN       | International Council of Nurses                                                     |
| ID        | Identity Document                                                                   |
| ILO       | International Labor Office                                                          |
| IPRC      | Identification, Placement and Review Committee                                      |
| IQR       | Interquartile Range                                                                 |
| NHS       | National Health Service                                                             |
| NIOSH     | National Institute for Occupational Safety and Health Administration                |
| OR        | Odd's Ratio                                                                         |
| OSHA      | Occupational Safety and Health Administration                                       |
| PSI       | Public Services International                                                       |
| QR        | Quick Response                                                                      |
| QuIN16VIP | The 2016 Italian National Survey on Violence towards Emergency Nurses Questionnaire |
| RC        | Republic of Cyprus                                                                  |
| SD        | Standard Deviation                                                                  |
| SE        | South-Eastern                                                                       |
| SHSO      | State Health Services Organization                                                  |
| TV        | Television                                                                          |
| USA       | United States of America                                                            |
| WHO       | World Health Organization                                                           |

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*Perspective*

# Overcoming Barriers in the Introduction of Early Warning Scores for Prevention of In-Hospital Cardiac Arrests in Austrian Medical Centers <sup>†</sup>

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## Abstract

**Introduction:** In-hospital cardiac arrest (IHCA) is still associated with high mortality. Introduction of multi-parameter early warning systems (EWS) could reduce the incidence of IHCA. However, data regarding prevention of IHCA remains conflicting. Moreover, an aging population and a shortage of healthcare workers strain Austrian acute care hospitals. Sicker patients and fewer staff could hinder the implementation of multi-parameter EWS in Austria. Therefore, we sought to identify such barriers by assessing local and national data. Furthermore, we investigated the incidence of in-hospital cardiac arrests at Medical University Innsbruck. **Methods:** In this perspective study, we retrospectively analyzed all patients experiencing an in-hospital cardiac arrest between 2017 and 2024. In the qualitative part, ten experts in in-hospital emergency medicine were interviewed using guided interviews. The main results from the interviews were identified using a structured content analysis according to Mayring. Quantitative and qualitative data were integrated through narrative. Using the Consolidated Framework for Implementation Research, we stratified our data into five domains. Finally, we applied the “eight steps for leading change” to develop a practice guideline. **Results:** In six years, 1356 patients were treated by an emergency medical team; 1317 emergencies were included, with 365 of them being resuscitated. Overall, 114 survived for 24 h. The incidence rate of in-hospital cardiac arrests was 0.86 cases/1000 admissions per year. The guided interviews demonstrated a nearly complete absence of EWS using multiple parameters in Austria. Strained human resources after the pandemic, the fear of an increased workload and the lack of robust data regarding the benefit of survival were mentioned as main reasons. The best practice tutorial considers the challenges identified and provides guidance for structured implementation in hospitals. **Conclusions:** Implementing NEWS2 can facilitate detection of critically ill patients despite decreased staffing. Identifying common barriers and facilitators in five domains described and applying this to the “eight steps for leading change” enabled us to provide a tutorial for implementation of an EWS. This could help master future challenges in in-hospital emergency medicine.

**Keywords:** in-hospital cardiac arrest; survey; adults; early warning scores; shortage of resources; process management; change management; best practice tutorial

## 1. Introduction

In Austria, a dense network of acute care hospitals exists, with approximately seven hospital beds per 1000 inhabitants [1]. Twenty-eight specialized hospitals provide an extended range of medical services beyond basic care. Seven central hospitals offer comprehensive care 24/7 for acute and complex medical needs. These hospitals treat a plethora of patients and in-hospital emergencies. One of the worst emergencies, in-hospital cardiac arrest (IHCA), is still associated with high mortality. Given the incidence of IHCA ranging from 1.5 to 2.8 per 1000 in-patient hospital admissions in Europe [2], emergency medical (critical care outreach, CCO) teams of such centers face the challenge of a timely response. One of several attempts to improve survival in IHCA was the implementation of multi-parameter early warning systems (EWS). It has been shown that 80% of patients on general wards exhibit significant clinical deterioration within 24 h prior to an IHCA [3–6]. Therefore, clinical decision-support tools were designed to detect early signs of patient deterioration. In short, hospitalized patients undergo routine vital sign measurements to detect clinical deterioration (“the tracking”). This is combined with the calculation of the EWS score: the worse the patient’s condition is, the higher the score sums up. When reaching predefined thresholds, alerts are triggered to prompt clinicians to take predefined actions based on score levels. This is often referred to as “track and trigger” systems. Other EWS trigger alerts are based on single-parameter thresholds, such as a respiratory rate > 30 or systolic BP < 90 mmHg. In summary, EWS aims to facilitate the timely recognition of patient deterioration outside critical care settings and ensure prompt intervention by appropriately skilled personnel. Furthermore, this early detection could prevent futile critical care as well as permanent damage to the health of our patients.

Since 2000, a plethora of EWSs have been introduced; one of the best evaluated EWSs is the second version of the NEWS assessment tool [7]. In the validation study of the NEWS, it was shown that this score was better at predicting unplanned ICU admission and death within 24 h than 33 other early warning systems, but not the occurrence of IHCA [8,9]. In England, the NEWS had been implemented in about three-quarters of acute hospitals by 2015. This measure reduced the incidence of IHCA by almost 10% [10]. In the first version of NEWS, a normal value of SpO<sub>2</sub> of  $\geq 96\%$  and an SpO<sub>2</sub> of  $\leq 91\%$  already triggered the maximum point value of 3 in this category, so excessive use of oxygen could occur in chronic lung diseases [11]. This was improved in 2017 with an update to a newer second version (NEWS2) [7]. However, this increased the complexity of the score and reduced its sensitivity [12]. Furthermore, inconsistent success in reducing mortality through the implementation of EWS has been shown [13,14]. This may be due to methodological weaknesses in the validation of many EWSs [13]. Moreover, good performance in some subgroups does not warrant its use in all diseases and all clinical settings [15].

Expeditious detection of critical patients outside of highly specialized intensive care units still poses difficulties as personnel resources are getting strained more and more in Europe [16]. At the same time, an aging Austrian population will lead to sicker and older patients in healthcare [17].

Looking at the processes involved in in-hospital emergencies enables efficient use of already scarce resources [18]. A wide variety of professional groups and specialist areas interact in healthcare and face increasing demands on effectiveness and quality. Moreover, the amount of time that healthcare professionals spend directly with the patient is decreasing. This is even more relevant as the assessment of EWS takes more time than simple measurement of vital signs even if being facilitated electronically [19,20]. This may be a barrier from the perspective of the staff on the wards. Additionally, after the pandemic, interest in the use of wearable devices for ease of continuous monitoring of vital signs grew [21].

Despite this shortage of time in healthcare, recent ERC recommendations for the usage of EWS disregard substantial differences between different healthcare systems [22]. This leads to a distinct gap in research: do barriers exist when, e.g., NEWS2, developed in the UK, is transferred to any other country without modifications?

Our primary objective was to provide a contiguous overview of the local situation regarding in-hospital cardiac arrests at Medical University Innsbruck. Therefore, we first investigated the rate of IHCA and its survival at the Medical University Innsbruck.

Based on this data, we sought to consult experts in adult in-hospital emergency medicine from central and specialized hospitals in Austria. Semi-structured interviews should investigate the current situation of adult in-hospital emergency medicine and the distribution of EWSs in Austria. Moreover, we aimed to identify barriers during the implementation of an EWS in such hospitals.

Lastly, we applied the Consolidated Framework for Implementation Research (CFIR) to stratify our local data into five domains when implementing an EWS. By describing the domains of innovation, of the outer setting, of the inner setting domain, of the individual, and of the implementation of the process, respectively, we sought to structure the available literature and local data from different perspectives. Finally, we wanted to provide guidance for implementation in a real-world setting by using Kotter's "eight steps for leading change" [23].

## 2. Materials and Methods

### 2.1. Study Design

We analyzed quantitative data regarding the local incidence of IHCA first. Subsequently, we conducted a qualitative analysis for an in-depth understanding of current in-hospital emergency medicine in Austria. Through a cohesive report, the quantitative and qualitative data strands were weaved together. Using the Consolidated Framework for Implementation Research (CFIR) allowed us to explain barriers and facilitators for the implementation effectiveness of EWS. Finally, we created a best-practice tutorial according to the "eight steps for leading change" [22].

### 2.2. Quantitative Methods

#### 2.2.1. Subjects

We included all patients experiencing an in-hospital cardiac emergency between 1 January 2017 and 31 December 2022 at the Medical University Innsbruck. Patients aged < 18 years were excluded.

Depending on the location of an IHCA, one of two adult CCO teams is alerted 24/7 using structured alarm criteria (single track-and-trigger system) as recommended by the ERC guidelines [22]. They comprise a minimum of an intensivist and two intensive care nurses. All patients received post-resuscitation care at one of the tertiary intensive care units of the Department of Anaesthesiology and Critical Care Medicine and the Department of Internal Medicine, Medical University Innsbruck, Austria. These ICUs treat surgical, post-trauma, and medical patients.

#### 2.2.2. Collection of Quantative Data

We prepared our retrospective work according to "The strengthening the reporting of the observational studies in epidemiology (STROBE)" statement [24] (Supplementary Table S1). We reviewed the electronic records of both adult hospital CCO teams. We identified the number of all in-hospital emergency calls and all patients who were treated by a CCO team. Thereafter, we collected the rate of IHCA and the rate of return of spontaneous circulation (ROSC) from the annual in-hospital emergency report. Survival after 24 h was

obtained by reviewing the medical reports of the respective patients. The annual admission rates were obtained from the public annual report of the Medical University.

### 2.2.3. Variable Distribution

Statistical analyses were performed using SPSS (Version 22.0. Released 2013, Armonk, NY, USA: IBM Corp.). Data were checked for normal distribution using the Shapiro–Wilk test. Based on the data normality and the type of variables, results are presented as mean (standard deviation), frequency (percent), and median (interquartile range). Patients with a significant amount of missing data in their records were excluded.

## 2.3. Qualitative Methods

The qualitative part consisted of guided interviews with experts in in-hospital emergency medicine. In Austria, acute care hospitals are classified based on the scope of services they provide. Currently, there are

- (1) Ninety-three standard hospitals providing basic healthcare services;
- (2) Twenty-eight specialized hospitals providing an extended range of medical services beyond basic care;
- (3) Seven central hospitals offering comprehensive care 24/7 for acute and complex medical needs.

### 2.3.1. Selection of Participants

The qualification criteria for experts were defined as having practical experience of at least three years, occupying a leading function for at least five years or having published in the field of in-hospital emergency medicine before. For our study, we used the term “medical center” for specialized and central hospitals. Moreover, it was stipulated that these experts were employed in either of these hospitals.

Recruitment started using personal contacts from one author (BT) to the 7 central hospitals and the 28 specialized hospitals in Austria. These persons were requested to name members of their teams performing in-hospital emergency medicine regardless of their profession within one month. This revealed a sample of 41 persons. Using sector analysis, we screened to see if our predefined qualification criteria were met. Thereafter, 29 experts received an interview request, resulting in 5 interviews. This was followed by the snowball principle (i.e., asking respondents about other possible interview partners), leading to another five interviews [25,26].

### 2.3.2. Collection of Qualitative Data

All authors defined the research objectives and identified the key issues. Thereafter, one of the authors (BT) developed an interview guideline using open-ended questions. The questionnaire draft underwent pretesting to confirm reliability and validity and to reduce the risk of subjective bias in the questionnaire. Finally, nine main and three follow-up questions addressed topics such as the structure of in-hospital emergency medicine, EWS, the mode of alerting, barriers when transferring EWS to Austria, the role of the management, and changes due to the pandemic. Finally, basic sociodemographics were categorized to ensure anonymity (see supplements for interview guide).

The guided interviews were conducted by one author (BT). After giving written consent, the location of the interview was determined at the request of the research participants, either using online video meetings (Zoom Communications, Inc., San Jose, CA, USA, 2023. Link: <https://us05web.zoom.us/j/3464772323?pwd=cjVkJURmR2s2Q1VZSnUrSi9yRTd3dz09> (accessed on 15 April 2023, 13 June 2023)) or face-to-face meetings at the participants' work places. During the interviews, alongside structured expertise, emphasis was placed

on practical and procedural knowledge. Thus, this group of people possesses specialized ‘abstract’ expertise and exclusive knowledge in this subject area [25]. Furthermore, the interviewer contributed as a co-expert to discuss challenges at a high professional level. All interviews were audiotaped, transcribed, and subsequently deleted from the recording device.

Recruitment sought to include experts from each federal state as a minimum requirement to obtain meaningful statements. Moreover, a maximum of twenty interviews was sought to be required to reach theoretical saturation, given recent data. For better comparability, pediatricians were omitted as their patients are even more heterogeneous than adults.

### 2.3.3. Qualitative Analysis

Initially, a first version was created with the help of Amberscript (Amberscript Global B.V., Amsterdam, The Netherlands), achieving a transcription accuracy of about 75–80%. All transcripts were checked multiple times and corrected for content accuracy. Additionally, linguistic smoothing was applied to statements influenced by dialect, as the primary interest was in the substantive content. Thereafter, a structured content analysis according to Mayring using the MAXQDA software (VERBI-Software, Consult Sozialforschung GmbH, Berlin, Germany) occurred [27]. First, in this systematic, rule-based qualitative method, a coding guideline was deductively derived from relevant literature in the field. Each category was defined and supplemented with coding rules. Thereafter, the textual content was segmented into coding units and assigned to the appropriate categories.

Thereafter, these categories were aligned with the four main components of in-hospital emergency systems (efferent and afferent limb, administrative part, quality management). Additional categories were derived from the interview guide. The analysis was conducted chronologically, following the course of the conversation. After coding the first half of the interviews, a review of the codes was conducted. Codes that were never applied were removed, and the descriptions were further refined. Finally, the emergent themes and main results were derived.

### 2.4. Integration of Quantitative and Qualitative Data

We chose the contiguous approach of integration through narrative and present the quantitative and qualitative findings side-by-side [28]. After reporting both types of data, an explanatory text links both datasets, thus allowing for a comprehensive interpretation. After identification of barriers to the implementation of EWS, we sought to provide a best practice tutorial, as many efforts to implement evidence-based innovations fail, even with highly developed implementation plans [29]. To avoid this, frameworks describing determinants such as barriers or facilitators are useful to develop much-needed context measures [30]. For this analysis, the Consolidated Framework for Implementation Research (CFIR) was used as it aims to predict or explain barriers and facilitators for implementation effectiveness [31]. Based on the five domains of the CFIR, we analyzed the results of the empirical data and existing literature [29]. As part of the last domain, the implementation process domain, we sought to provide practical guidance for the implementation of NEWS2 at Austrian medical centers. The generated insights from the interviews were then assigned to Kotter’s “eight steps for leading change” [23].

### 2.5. Ethics

The prospective part of the study was approved by the Research Committee for Scientific Ethical Questions (RCSEQ) of the Private University for Health Sciences and Health Technology, 6060 Hall in Tirol, and the Health University of Applied Sciences Tyrol,

6020 Innsbruck, Austria (protocol of 1 March 2023). All interviewed experts gave written consent before the interviews.

The retrospective part was approved by the Ethics Committee of the Medical University of Innsbruck, Austria (1151/2021). Patient consent was waived due to the retrospective study nature.

### 3. Results

#### 3.1. Local Data Regarding IHCA in Innsbruck

From 1 January 2017 to 31 December 2022, 439,701 patients were admitted to an in-patient department at the medical center Innsbruck. In total, 27.7% of all verified in-hospital emergencies experienced an IHCA, 53.7% of all resuscitated patients experienced ROSC, and 32.8% survived for 24 h (see Figure 1).

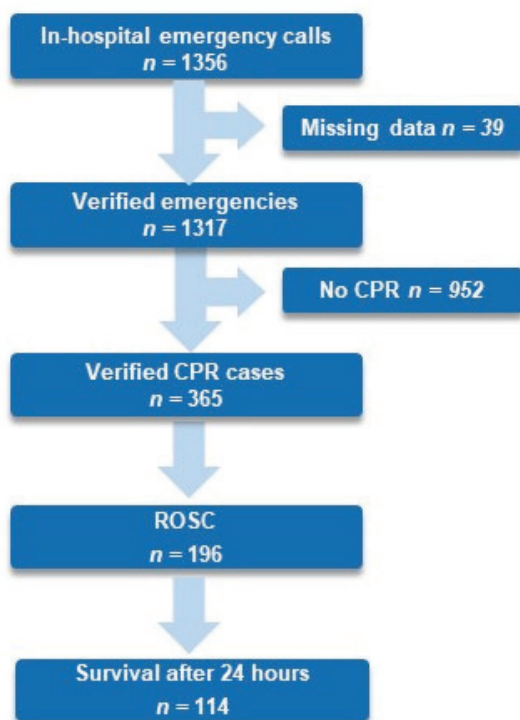


**Figure 1.** Flow chart of in-hospital emergencies, ROSC, and survival until 24 h after in-hospital cardiac arrest at Medical University Innsbruck from 1 January 2017 to 31 December 2022. Abbreviation: CPR, cardiopulmonary resuscitation; ROSC, return of spontaneous circulation.

The annual rates of in-hospital emergencies, IHCA, ROSC, and survival after 24 h are presented in Supplementary Table S2. Figure 2 presents the annual incidence of IHCA per 1000 in-patient admissions.

#### 3.2. Data from the Guided Interviews

Ten experts from Austrian medical centers were interviewed, with an overall duration of 210 min and 21 s. As of the ninth interview, the provided answers revealed a high share of recurrence, thus showing signs of theoretical saturation [32].

Eight interviews were conducted using Zoom; two interviews were performed at the participants' work places. For characteristics of the interviewed experts see Table 1.

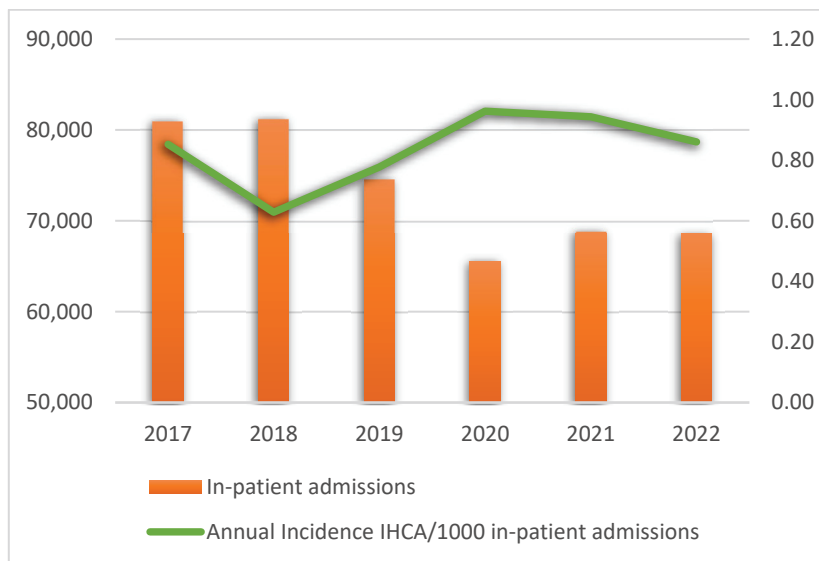


**Figure 2.** Annual incidence of in-hospital cardiac arrest per 1000 in-patient admissions. Abbreviation: IHCA, in-hospital cardiac arrest.

**Table 1.** Characteristics of the interviewed experts [n = 10].

| Characteristic                                 |                    | Number of Participants |
|------------------------------------------------|--------------------|------------------------|
| Sex                                            | Female             | 1                      |
|                                                | Male               | 9                      |
| Age                                            | 31–40 years        | 2                      |
|                                                | 41–50 years        | 5                      |
|                                                | 51–60 years        | 2                      |
|                                                | >60 years          | 1                      |
| Working experience                             | ≤3 years           | 0                      |
|                                                | 4–7 years          | 0                      |
|                                                | 8–15 years         | 2                      |
|                                                | >16 years          | 8                      |
| Experience in in-hospital emergency medicine   | 3–5 years          | 1                      |
|                                                | 6–8 years          | 0                      |
|                                                | 9–11 years         | 3                      |
|                                                | >12 years          | 6                      |
| Profession                                     | Nurse practitioner | 2                      |
|                                                | Doctor             | 8                      |
| Hospital beds at occupation of the participant | >500 beds          | 4                      |
|                                                | >1000 beds         | 6                      |

The qualitative results are presented in chronological order.

### 3.3. Structure of In-Hospital Emergency Medicine in Austria

Most in-hospital emergency medicine in Austrian medical centers is performed by anesthesiologists and internists.

*“We are operating within that magnitude. Approximately half and half: anesthesiologists and internists.” (interview 1, line 279, consultant lead for in-hospital emergency medicine, board-certified specialist in anesthesiology and intensive care medicine, specialized hospital)*

Due to decentralized units, hospitals may have several CCO teams. Almost all hospitals use a standardized alerting mode (mostly a uniform phone number). Nearly one half use structured alerting criteria.

*“We have alert criteria, if you want to call them that. These were taken from Hillman’s work around 2000 or 2001. They’ve been tested since 2010 and have been in use since 2012. They’re what you call ‘single track and trigger’ systems.” (interview 4, line 61ff, critical care nurse, in-hospital emergency management coordination unit, central hospital)*

Interestingly, data showed a nearly complete absence of the usage of EWS in Austria, except of single track-and-trigger systems. Moreover, consistent quality management in in-hospital emergency medicine remains scarce.

### 3.4. Barriers to the Implementation of EWS

We identified the strained human resources after the pandemic, the fear of an increased workload for the CCO team and the lack of robust data regarding a benefit of survival as being the primary barriers.

*“I think it mainly fails because of nursing staff, simply because there isn’t enough capacity to check on every patient on the general ward once an hour or so. They’re just, probably everywhere, really at their limit.” (interview 9, line 238ff, board-certified specialist in anesthesiology and intensive care medicine, clinical responsibilities in in-hospital emergency medicine, central hospital)*

Moreover, with reorganization of the board-certified national nursing training, as of 2024 more care assistants were attending patients on in-patient wards. As the clinical assessment remains pivotal in the timely recognition of critically ill patients, less educated staff could lead to later recognition of such patients.

*“Another important aspect is the academization of nursing which was certainly not a beneficial development. Experience and clinical intuition remain essential to recognize a deteriorating patient.” (interview 8, line 160ff, head of department of anesthesiology, board-certified specialist in anesthesiology and intensive care medicine, specialized hospital)*

Finally, all experts perceived easy access to regular training as a facilitator for obtaining high quality of in-hospital emergency medicine.

*“It is important—indeed absolutely essential—that hospital staff possess certain knowledge and skill, especially in an acute care hospital. I believe that for quality assurance reasons, there is no way around maintaining a low-threshold access, and also offering regular training sessions.” (interview 4, line 225ff)*

In summary, the interviews provided data on the reasons for refraining from EWS and problems and challenges faced during implementation. For a successful implementation of EWS, numerous framework conditions in the complexity of acute care hospitals need to be considered. In the following paragraph we propose a solution as a “best practice tutorial”, which can be used as a guideline for implementing EWS on a local or a national basis.

### 3.5. Best Practice Tutorial

Based on our empirical data and the existing literature, we describe the five domains of the CFIR:

#### 1. Innovation domain

The first domain describes the early identification of critically ill patients before deterioration to reduce mortality. As neither patients nor CCO teams can predict when a patient’s condition will deteriorate, EWS should be implemented for all patients, especially on general wards. However, our survey revealed a missing distribution of EWS in Austria.

*“We do not use either MEWS or NEWS. They were temporarily used in one unit, but that happened to be an IMCU ward—essentially an environment for which these scores were neither intended nor designed. Consequently, they are no longer used there.” (interview 2, line 111ff, board-certified specialist in anesthesiology and intensive care medicine, clinical responsibilities in in-hospital emergency medicine, central hospital)*

Moreover, there is no nationwide plan to introduce them. With regard to the procedures for in-hospital emergencies, EWS contribute to a more efficient use of scarce resources and can minimize the costs of intensive care. Even if competencies are defined and theoretically available, clinical experience shows other problems with availability, motivation, and/or pronounced hierarchies. EWS can attenuate interprofessional collaboration.

*“Nursing staff is glad to have a structured concept in place, so they can say: you need to take care of this patient now because I have documented this value.” (interview 6, line 190ff, physician-in-charge of ICU, board-certified specialist in anesthesiology and intensive care medicine, responsible for the in-hospital emergency team, central hospital)*

Young colleagues in particular have well-founded reasons for requesting further clinical expertise for critically ill patients based on a score. This holds especially true given the aging population and the expected increase in the number of chronically ill patients, especially older ones [17].

*“Yes, but even the ward physician can be overwhelmed, because nowadays the spectrum of illnesses that patients bring with them is simply much broader.” (interview 10, line 277f, critical care nurse, intermediate care unit, department of orthopedic and trauma surgery, central hospital)*

Moreover, EWSs are particularly helpful in the case of pronounced hierarchical barriers [33].

## 2. Outer Setting domain

The outer setting domain describes the surroundings in which the inner setting exists. Factors from multiple outer settings have been identified:

### a. Process Management

Structured process management offers the opportunity to solve common problems (e.g., waiting times, missing medical reports) through clearly defined processes [18]. The administrative part of process management deals with the control and the provision of resources (e.g., material, personnel, budget) and a comprehensive training concept. The implementation of EWS initially incurs costs, and this is a frequently cited reason for not introducing EWS.

*“If people don’t exceed their maximum working hours, they can sign up for as many trainings as they want. That counts as working time, these are the costs.” (interview 5, line 3119ff, head of the emergency department, board-certified specialist in internal medicine, specialized hospital)*

However, higher staff qualification is associated with a lower mortality rate and can increase patient safety [34].

### b. Quality Management

An increase in quality and productivity can only be achieved through strategic investments in staff training, digital infrastructure, and patient-centered care models. Furthermore, developing the quality of care is a top priority nationwide, uniformly across federal states, sectors, and professions. This needs robust data that have to be collected by (multi-)national registries like the German Resuscitation Registry.

*“We are members of the German Resuscitation Registry. We document our emergencies using a protocol provided by the German Resuscitation Registry. Two of my senior*

*physicians consistently enter the data into the database. We thoroughly review the annual report and implement appropriate measures based on its findings.” (interview 7, line 149ff, head of department of anesthesiology, board-certified specialist in anesthesiology and intensive care medicine, specialized hospital)*

In the future, Austrian medical centers will have to prevent a reduction in the quality of in-hospital emergency care due to a shortage of staff by the implementation of an internationally validated EWS.

#### c. Hospital Management

Commitment of the management is pivotal in the introduction of an EWS.

*“Based on my impression, there would be a willingness to invest a certain amount of money if, an early warning system were to be implemented. This requires training, which incurs costs primarily due to the time spent on duty. I do believe such a willingness exists.” (interview 3, line 200ff, consultant lead for in-hospital emergency medicine, board-certified specialist in anesthesiology and intensive care medicine, specialized hospital)*

The primary goal of management must be to deliver high-quality emergency care to all patients and employees, utilizing available resources effectively. It also requires a willingness to invest considerable sums in the necessary staff training to ensure patient safety.

#### d. Society

From the point of view of society and health economics, as many patients as possible should be protected from serious consequential disabilities after in-hospital emergencies to maintain their workforce. Given the lack of further insight into in-hospital emergencies, a survey at federal level is warranted to obtain robust data.

*“And if such a requirement is centrally mandated by the ministry, it makes implementation significantly easier.” (interview 6, line 292f)*

### 3. Inner Setting domain

The inner setting domain describes the setting in which the innovation is implemented. Our data revealed that the current shortage of staff and the associated shortage of hospital beds may result in premature transfers to general wards, even though monitoring would still be necessary. The inconsistent electronic documentation across Austria was also identified as a barrier.

*“As a responder, one must have rapid and clear access to all relevant information. I require a well-organized overview of the patient’s condition over the preceding thirty minutes, which, of course, further supports the adoption of electronic solutions.” (interview 7, line 209ff)*

Therefore, we recommend a nationwide introduction of electronic documentation and the implementation of EWS on general wards. Given the available data we recommend NEWS2 as EWS.

#### 4. Individual domain

This domain describes the roles and characteristics of individuals who are part of the implementation process of EWS:

##### a. Emergency patients

All emergency patients are entitled to receive emergency care following best practice.

##### b. Alerting staff

The alerting staff requires expeditious and competent support. Additionally, thresholds for activating a CCO team should remain low to ensure timely intervention.

*“I would suggest lowering the threshold—that is, encouraging the staff to call whenever they have a concerning gut feeling.” (interview 1, line 221ff)*

As a higher level of staff qualification is associated with a lower mortality rate, access to regular training is recommended. In addition to training, clinical experience is also a key factor.

*“[...] What’s still essential is experience and clinical intuition—being able to tell if someone is unwell or has a problem. You only learn that by spending a lot of time directly with patients.” (interview 8, line 160ff)*

c. Emergency Teams [Deployed staff]

The CCO teams are mainly staffed by critical care personnel. Our results expressed the fear that the introduction of EWS could lead to a sharp increase in the number of alerts.

*“What should be avoided is a sudden increase in unjustified or non-indicated alerts. This would likely lead responders to start questioning the system as a whole.” (interview 3, line 178ff)*

Those who are confronted with emergency patients first and often alone should not be given a feeling of ignorance. Providing them a feeling of safety and certainty about how to proceed is the only way to secure an alert in time for the next emergency.

5. Implementation process domain

As seen in previous domains, multiple factors must be considered before implementing NEWS2. By assigning our findings to one of Kotter’s “eight steps for leading change” [23], we developed a structured guideline (see Figure 3).

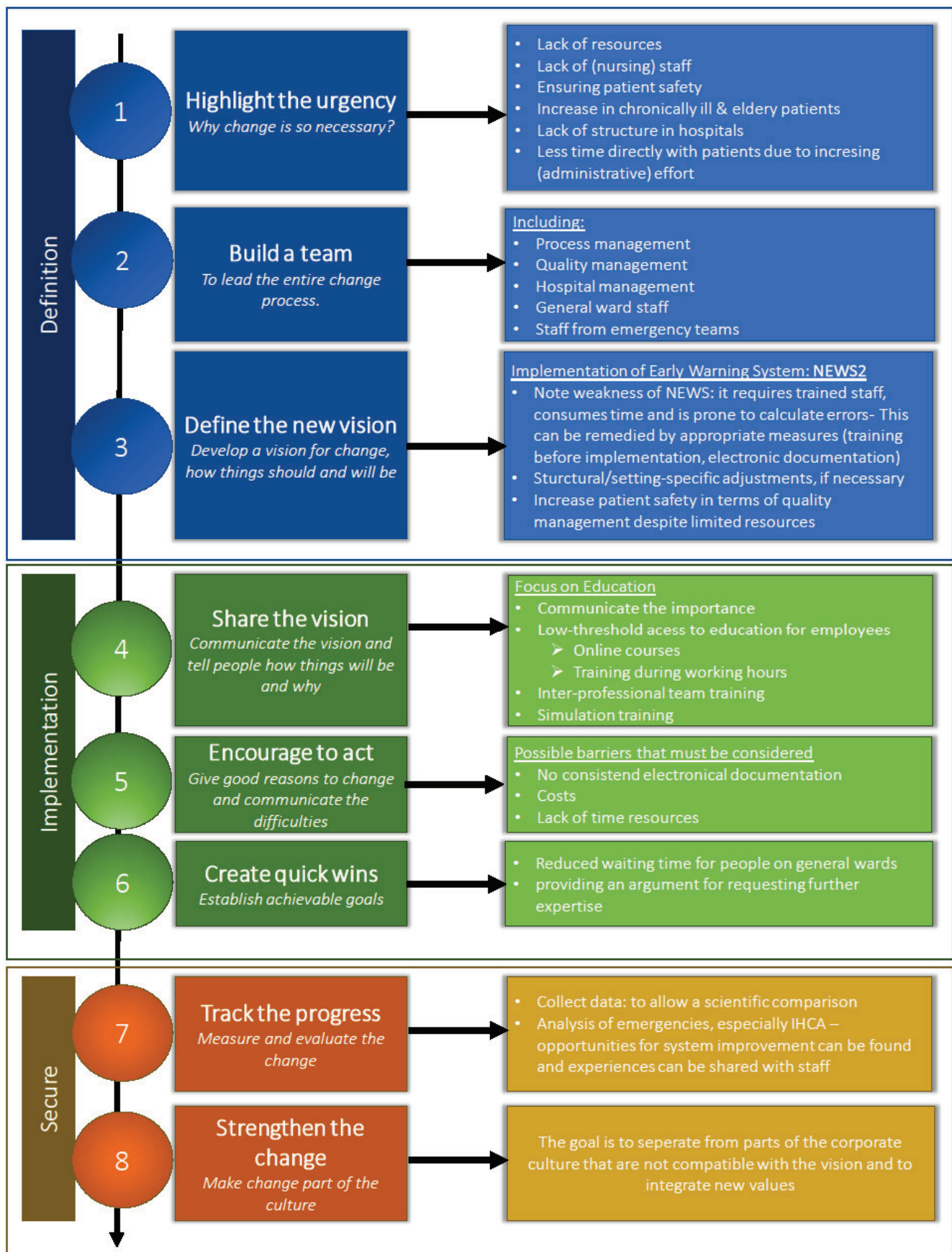


**Figure 3.** Practical guideline for implementation of NEWS at Austrian medical centers based upon the “eight steps for leading change” (according to Kotter) [23].

#### 4. Discussion

In this study, we first identified a surprisingly low incidence of in-hospital cardiac arrests (around 0.9/1000 in-patient hospital admissions) at our central hospital, which is nearly half of the reported rate across Europe (1.5–2.8/1000). This may be partly explained by the 24/7 availability of two highly specialized adult CCO teams with short response times, as such teams have been shown to decrease the rate of IHCA and, to a lesser extent, mortality. Clearly, the incidence of IHCA may be an inaccurate indicator of the quality of care, as IHCA is still rare, and fair comparisons need an adjustment for the case mix of patients [35]. Our observed ROSC rate of 54% is comparable with recent data. In addition, this meta-analysis reported 36% survival at 24 h, resembling our data. However, a high heterogeneity of the included studies hinders comparability, and knowledge of local data proves to be pivotal.

Interestingly, the introduction of NEWS in English hospitals was associated with a reduction in the rate of IHCA, but not mortality [10]. From a health economics perspective, evaluating the potential cost savings associated with the prevention of IHCA is reasonable. US registry data estimated first-year follow-up costs of USD 19,000 per patient after surviving an IHCA [36]. Such numbers support the reasoning towards management. Unfortunately, no such data is available for Austria.

Despite the observed low incidence, we feel that still too many patients face possibly preventable harm from IHCA. An underlying reason may be the still low usage of EWS in Austria as compared to the high level of EWS distribution in England [35]. Thus, the implementation of EWS is the next step needed in Austria. Prior to this, the reasons for the inconsistent reductions in incidence of IHCA or mortality after the implementation of EWS have to be addressed [13,14]. As part of the outer setting, barriers such as staff shortages, workload concerns, and lack of robust survival data were reported. This is in line with European workforce challenges and previous EWS implementation studies [16].

By 2050, the proportion of the very elderly population aged 85 and over in Austria will more than double. Thus, an aging population will lead to sicker and older patients, which is one reason for increased demands in national health systems [17].

Clearly, age alone should not be considered a risk factor for IHCA but should be combined with clinical status, comorbidities, and hospital-level factors (e.g., staffing, response systems) [37]. In addition, age was excluded in the development of NEWS, as its addition only marginally improved the area under the receiver operating characteristic curve [38]. Despite the historically high number of healthcare providers across Europe, an efficient deployment of personnel is needed [16].

As 80% of patients on general wards show a significant clinical deterioration in the 24 h before an IHCA, the usage of structured alert criteria or EWS allows for easier identification by staff on-site [3,5,39,40]. Clearly, this depends on a reliable assessment of vital signs by experienced nurses. However, our results revealing difficulties in expeditious detection of critical patients outside of intensive care units are in line with current literature [41]. Moreover, from the perspective of the individuals in the CFIR approach, a high level of regular training has been described as a facilitator by our experts.

From the perspective of the innovation domain, a question arises: what is the most appropriate EWS? Here we chose one of the best evaluated EWSs, the second version of the NEWS assessment tool [7], as it was developed in the UK, another European country. However, the notable differences between the UK health system and the Austrian system and others globally have to be kept in mind. Given the complexity of EWS, it is essential to pay attention to the weakness of NEWS2: it [a] requires trained staff, [b] consumes time, and [c] is susceptible to calculation errors [19,38]. However, considering these pitfalls ensures success by avoiding early missteps. This aligns with our findings of high-quality

staff training and elaborate electronic documentation in hospitals as essential prerequisites. The use of an electronic EWS can reduce the workload and minimize the demonstrated fear of an increased workload [10]. Hogan and coworkers demonstrated that the conversion from paper to electronic NEWS usage was associated with a 7.6% decrease in IHCA rates in England [still with unchanged mortality rates] [35]. Moreover, this is in line with the appraisal of our experts. In summary, we agree with Hogan et al. concluding that the exact structure of the efferent response arm of EWS may not be as pivotal as a timely response.

Another barrier from the inner setting of the CFIR framework could constitute the fact that good performance of an EWS in some subgroups assumes this in all other clinical settings [15]. However, the latter is no evidence for the ineffectiveness of EWS; its correct application poses its true challenge. Possible risks may include the wrong prioritization of scores over clinical intuition with subsequent late responses in some cases or a lack of sensitivity in particular patient subgroups [42,43]. Our data, showing an inhomogeneous organization of in-hospital emergency medicine in Austria, hinders comparability already at a national level. Moreover, the Austrian context differs from countries with widespread EWS adoption (e.g., UK), highlighting the need for adaptation to national structures.

As the COVID-19 pandemic exacerbated pre-existing challenges like aging populations, increases in chronic diseases, increasing expectations from patients, etc., feasible solutions are needed [16]. Our findings reinforce previous evidence that using wearable devices for continuous monitoring of vital signs could ease a widespread implementation of EWS [21]. Moreover, web-based learning for early recognition improved assessment and management of deteriorating patients [44]. Such tools may further facilitate the introduction of an EWS. However, the impact of these new technologies upon incidence and mortality of IHCA has still to be investigated. Moreover, structured data collection at a federal level is warranted. This enables tailoring international EWS to national needs for improving survival after IHCA.

To ease the transfer of our results into clinical practice, we provide a practical guideline on the setting and circumstances of the implementation of an EWS. Our results demonstrated the apparent urgency for change and the nationwide implementation of EWS. Considering the main barriers and facilitators can create quick wins like a quicker assessment of vital signs [45]. Thereafter, ongoing data acquisition regarding IHCA and EWS performance is essential for the change, and aiming for continuous improvement remains essential.

### *Limitations*

When interpreting our results, several limitations have to be kept in mind. Clearly, our data being from only one European country, as well as the small number of qualitative interviews, limits the representativeness of our results. However, the theoretical saturation led to the cessation of recruitment after ten experts. We used personal contacts and snowballing for recruitment, which introduces the risk of selection bias. As only staff from Austrian medical centers were interviewed, this could bias our results and hinder comparability with other hospitals and healthcare systems. However, we sought to provide data that were as comparable as possible. Moreover, the development of the interview guide by one author can be seen as a limitation. Considering the voluntary and self-administered nature of the questionnaire, we do not dispute the possibility of potential response and self-selection bias in the open-ended questions of the survey. Moreover, particular interests of the respondents, e.g., a high pressure to cut costs, could have led to a subjective bias in our qualitative results.

Recruitment was rather tedious, which may have led to a disproportionate share of senior staff members as these were contacted. Moreover, as only one female expert was interviewed our data cannot be generalized to both sexes.

Finally, we cannot rule out the potential effect of missing data. We may have missed IHCA cases, as CPR in emergency rooms, critical care suites, etc., may have took place without alerting a CCO team. Furthermore, the rate of “do not resuscitate” orders may have changed. In summary, we emphasize that our findings are highly context-specific and not directly generalizable beyond Austrian hospitals.

## 5. Conclusions

We sought to investigate the reasons for inconsistent results on the effectiveness of EWS in the reduction in the rate of IHCA or mortality. Interviewing ten Austrian experts demonstrated an inhomogeneous organization of in-hospital emergency medicine and a low use of EWS in Austria. Moreover, strained staff resources after the pandemic, the fear of an increased workload, and the lack of reliable data on survival benefits were reported as the main barriers to the implementation of EWS. Therefore, adaptation to local settings is pivotal for a successful implementation of an established EWS. For structuring this complex process, we used the Consolidated Framework for Implementation Research to predict barriers and facilitators to implementation effectiveness. Proper staff training and elaborate electronic documentation are crucial facilitators, echoing evidence from English hospitals transitioning to electronic NEWS [10].

Application of our practical guideline should ease the implementation of NEWS2 in Austrian specialized and central hospitals. Ideally, this could reduce not only the incidence of IHCA but also mortality in this context. Such hospitals are advised to rethink their rapid response systems. The exact structure of the efferent response arm of EWS may be less important than the timely response on general wards ensured by an EWS.

As the recent pandemic fueled long-standing problems in healthcare, like an aging workforce, the time has come for effective measures. Regarding in-hospital emergency medicine, we urge Austrian politicians and stakeholders to introduce NEWS2 nationwide. The scientific community is needed to establish monitoring with a national registry for IHCA. Finally, future research should investigate the impact of new technologies on the assessment of early warning systems.

**Supplementary Materials:** The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/healthcare13202624/s1>; Table S1. The STROBE checklist; Table S2. Annual rates of admissions, in-hospital emergencies and survival at discharge at Medical University Innsbruck; Table S3. Code guideline; Table S4. The five most frequent coded categories. The self-developed interview guideline and the sociodemographic data of participants can be downloaded at <https://www.researchsquare.com/article/rs-3804937/v1> (accessed on 3 January 2024).

**Author Contributions:** Conceptualization: L.B., S.R., P.D. and B.T.; data curation: B.T. and L.B.; formal analysis: B.T., S.R. and L.B.; investigation: B.T.; methodology: L.B., S.R., P.D. and B.T.; project administration: B.T. and P.D.; resources: B.T. and S.R.; software: B.T. and S.R.; supervision: L.B. and B.T.; validation: L.B., S.R., P.D. and B.T.; visualization: L.B. and B.T.; writing—original draft: L.B., P.D. and B.T.; writing—review and editing: L.B., S.R., P.D. and B.T. All authors have read and agreed to the published version of the manuscript.

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approved on 21 June 2021 by the Ethics Committee of the Medical University of Innsbruck, Austria (approval no. 1151/2021).

**Informed Consent Statement:** The prospective part, all interviewed experts gave written consent before the interviews. The retrospective part, Patient consent was waived due to retrospective study nature.

**Data Availability Statement:** The datasets used and analyzed during the current study can be made available from the corresponding author on reasonable request due to institutional policies.

**Conflicts of Interest:** The authors declare no conflicts of interest.

## Abbreviations

The following abbreviations are used in this manuscript:

|       |                                                  |
|-------|--------------------------------------------------|
| CCO   | Critical care outreach                           |
| CPR   | Cardiopulmonary resuscitation                    |
| ERC   | European Resuscitation Council                   |
| EWS   | Early Warning Score                              |
| ICU   | Intensive care unit                              |
| IHCA  | In-hospital cardiac arrest                       |
| ILCOR | International Liaison Committee on Resuscitation |
| ROSC  | Return of spontaneous circulation                |

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## Article

# Nurses' Knowledge and Practices Regarding Delirium Management in Intensive Care Units in Cyprus: A Cross-Sectional Study

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## Highlights

### What are the main findings?

- ICU nurses demonstrated moderate–high knowledge of delirium.
- Routine delirium screening was reported by only 27.1% of nurses.

### What are the implications of the main findings?

- Structured delirium education and training programs are needed to improve nurses' competencies in delirium assessment and prevention.
- Implementation of standardized screening tools and protocols may strengthen ICU patient safety.

## Abstract

**Background:** Delirium is a frequent and serious complication in intensive care units (ICUs), associated with increased mortality, prolonged mechanical ventilation, extended length of stay, and long-term cognitive impairment. This study aimed to assess ICU nurses' knowledge and practices regarding delirium management in Cyprus and to identify predictors of knowledge. **Methods:** A cross-sectional study was conducted among nurses working in adult ICUs in Cyprus. Data were collected using a structured self-administered questionnaire that included demographic characteristics, sedation and analgesia practices, and an adapted Delirium Knowledge Questionnaire incorporating ICU-specific items. **Results:** A total of 70 ICU nurses participated, most of whom were female (60%) with a mean ICU experience of 5.1 years. Only 27.1% reported daily delirium screening, although 65.2% perceived delirium as frequent. Sedation protocols were reported by 34.3%, sedation scales were used by 44.3%, and daily sedation interruption by 61.4%. Only 15.7% had received formal delirium training, while 87.1% expressed the need for further education. Knowledge scores were moderate to high (68.5–84.0%), with higher scores among nurses with prior training and female nurses ( $p = 0.003$ ). Hospital type was associated with sedation practices, with greater use of sedation scales in public ICUs ( $p < 0.001$ ) and propofol more commonly used as first-line sedation compared with midazolam in private ICUs ( $p = 0.018$ ). **Conclusions:** Although ICU nurses demonstrated moderate knowledge of delirium, systematic screening and protocolized management remain suboptimal. Structured education and

standardized implementation strategies are required to strengthen patient safety in critical care settings.

**Keywords:** delirium; intensive care; nurses; patient safety; sedation; knowledge; critical care; Cyprus

## 1. Introduction

The intensive care unit (ICU) represents a high-risk clinical environment in which patient safety is continuously challenged by the complexity of critical illness and the intensity of therapeutic interventions. Despite advances in evidence-based critical care [1–3], preventable harm remains substantial, with the World Health Organization (WHO) estimating that up to 10% of hospitalized patients experience adverse events, the majority of which are preventable [4]. Within this context, neurological complications—particularly delirium—have emerged as central determinants of both short- and long-term patient outcomes.

In critical care, delirium is no longer conceptualized solely as an acute neuropsychiatric syndrome, characterized by disturbances in attention, awareness, and cognition [5,6], but as a manifestation of acute brain dysfunction within the broader framework of organ failure [7,8]. Recent research increasingly position ICU delirium at the interface of psychiatry, neurology, and critical care medicine, reflecting complex pathophysiological processes including neuroinflammation, neurotransmitter imbalance, and disrupted cerebral perfusion [9,10]. This reconceptualization underscores delirium as a form of acute encephalopathy with direct implications for long-term neurological integrity rather than a reversible consequence of illness. Moreover, delirium is not just a temporary complication of critical illness but an important factor contributing to long-term cognitive decline in ICU survivors, affecting recovery and quality of life [7]. Accumulating evidence demonstrates that delirium is a key driver of post-intensive care syndrome (PICS), particularly its cognitive domain. Longitudinal studies indicate that survivors of critical illness frequently develop persistent cognitive impairment affecting memory, executive function, and attention, with trajectories comparable to mild traumatic brain injury or early dementia [11].

The incidence of delirium in ICU populations remains high, affecting approximately 25–80% of patients [9,10,12], particularly those requiring mechanical ventilation [9,13]. Despite its high prevalence and established clinical significance, delirium remains substantially under-recognized in critical care settings [14]. Failure to detect and manage delirium early contributes to prolonged exposure to modifiable risk factors such as deep sedation, immobility, and sleep disruption, all of which are implicated in adverse neurocognitive trajectories [15]. From a patient safety perspective, delirium is strongly associated with increased mortality, prolonged mechanical ventilation, extended ICU and hospital length of stay, and higher rates of institutionalization [15]. Mortality risk among ICU patients with delirium is estimated to be two to four times higher compared to non-delirious patients, while six-month mortality also significantly increases [16]. Furthermore, delirium imposes a substantial economic burden on healthcare systems, with annual costs reaching billions of dollars globally. These clinical and economic repercussions position delirium as a critical patient safety issue, particularly within high-risk environments such as ICUs [17].

Patient safety in critical care settings depends on early detection of clinical deterioration, implementation of evidence-based protocols, and effective interprofessional collaboration [18]. The 2018 PADIS guidelines emphasize routine delirium assessment using validated tools, risk factor modification, and non-pharmacological preventive strate-

gies [19]. However, implementation of these recommendations remains inconsistent worldwide, largely due to gaps in knowledge, limited training, and variability in clinical practice [20,21]. Within this framework, frontline healthcare providers—particularly nurses—play a pivotal role [22]. Continuous bedside presence places nurses at the center of delirium detection, monitoring, and intervention. Their ability to identify early cognitive and behavioral changes, implement validated screening tools such as CAM-ICU, and apply non-pharmacological prevention strategies directly influences both the incidence and duration of delirium. Evidence suggests that structured, nurse-driven interventions, including components of the ABCDEF bundle, are associated with reduced delirium burden and improved long-term outcomes [23,24].

Conversely, inadequate training and inconsistent assessment practices contribute to missed diagnoses and delayed interventions, perpetuating the cycle of acute brain dysfunction and subsequent cognitive decline [25]. Evidence from multiple countries suggests that nurses' knowledge and practices regarding delirium management remain suboptimal. Studies in Iraq [26], the Netherlands [20], China [21], and Poland [27] report moderate to low knowledge levels and inconsistent screening practices. Barriers identified: shortage of personnel, interprofessional communication gaps, and difficult-to-assess patients [28]. Evidence indicates that targeted educational interventions significantly enhance nurses' recognition skills, protocol adherence, and overall patient safety, highlighting the need for systematic evaluation of delirium-related competencies [29,30].

In Cyprus, evidence regarding ICU nurses' knowledge and practices related to delirium remains limited. Understanding these factors is essential for identifying system-level gaps and designing targeted interventions aimed at improving both patient safety and long-term neurocognitive outcomes [31]. Therefore, the present study aims to assess ICU nurses' knowledge and practices regarding delirium management and to explore factors associated with knowledge variability within the Cypriot critical care context.

## 2. Materials and Methods

### 2.1. Study Design

A cross-sectional study was conducted to assess ICU nurses' knowledge and practices regarding delirium management in Cyprus. A cross-sectional design was considered appropriate to provide a comprehensive snapshot of current knowledge levels and clinical practices related to delirium screening, prevention, and sedation management. This approach aligns with similar international studies examining delirium-related competencies and patient safety practices among critical care nurses [31,32].

### 2.2. Setting and Participants

The study was conducted in five adult ICUs located in Nicosia and Limassol, Cyprus (two public, two private ICUs within the General Healthcare System (GHS) and one private non-GHS ICU), and included general ICUs managing medical, surgical, and mixed critically ill adult patients.

Eligible participants were registered nurses who:

1. Held a nursing degree (Bachelor's or higher);
2. Provided direct bedside care to adult ICU patients;
3. Had at least six months of ICU clinical experience;
4. Gave informed consent to participate.

Nurses in administrative roles or those not directly involved in patient care were excluded.

A convenience sampling approach was employed. Eligible nurses were recruited based on their availability during scheduled shifts in participating ICUs. Following institutional approval, the research team approached nurses who met the inclusion criteria and invited

them to participate. Participation was voluntary, and all eligible nurses present during the data collection period had an equal opportunity to participate. This approach was considered appropriate given the operational constraints of ICU settings, including shift work patterns and workload demands [33]. No formal a priori power calculation was conducted, as the study was designed as an exploratory cross-sectional investigation. Therefore, the sample size was not intended to detect statistically powered differences between subgroups but to provide an initial assessment of ICU nurses' knowledge and practices in the Cypriot context.

### 2.3. Data Collection Procedure

Data collection was conducted over a three-month period (October–December 2025). After obtaining institutional permissions, eligible nurses were invited to participate during scheduled shifts. Participants received an information sheet explaining the study purpose, confidentiality assurances, and voluntary participation. Written informed consent was obtained prior to questionnaire completion. The sample size was determined based on feasibility and consistency with similar cross-sectional studies conducted in critical care nursing populations. Due to the absence of prior national data on ICU nurses' knowledge of delirium in Cyprus, a formal power calculation was not feasible. A total of 70 participants were included, representing approximately 15% of the estimated national ICU nursing workforce. This sample size is considered adequate for exploratory analyses and is comparable to similar studies assessing delirium-related knowledge and practices among ICU nurses internationally [32]. The response rate was 70%, which is considered acceptable in survey-based healthcare research. The studies involving healthcare professionals often report response rates between 40% and 70% due to workload and shift patterns [20,21,33]. It should be noted that the limited representation of private non-GHS ICUs reflects the structure of the Cypriot healthcare system, where the majority of private hospitals are integrated into the General Healthcare System (GHS), and only a small number of private non-GHS units operate nationally.

### 2.4. Instruments

Data were collected using a structured, anonymous self-administered questionnaire developed for the Cypriot ICU context. The questionnaire consisted of two main parts:

#### Part 1: Demographic and professional characteristics

A structured questionnaire was developed to collect demographic and professional characteristics, which were collected using structured closed-ended questions, including nominal variables (gender, ICU specialization, hospital type), ordinal variables (educational level), and continuous variables (age, years of nursing experience, and years of ICU experience).

#### Part 2: ICU Sedation–Analgesia–Delirium Management Questionnaire

This section assessed:

- a. ICU sedation and analgesia management practices, including: presence of written sedation protocols, use of sedation scales, daily sedation interruption practices, frequency of use of sedative agents and analgesic use patterns. Responses were recorded using categorical or Likert-type scales.
- b. Knowledge, attitudes, and practices regarding Delirium, including: daily delirium screening practices, use of validated tools, perceived importance of prevention, previous delirium-related training and Delirium knowledge assessment:

The questionnaire was developed based on the Delirium Knowledge Questionnaire (DKQ), originally designed and developed by Hare et al. [34] and later refined by Detroyer et al. [29], to assess nurses' knowledge of delirium across key domains, including clinical

features, risk factors, and management strategies. In addition, 10 ICU-specific items were developed by the research team to reflect critical care-related aspects of delirium, including mechanical ventilation, sedation practices, circadian rhythm disruption, and early mobilization. Item generation was informed by current evidence and international guidelines, including the PADIS recommendations.

All items were structured as dichotomous (True/False) questions. Correct responses were scored as 1 and incorrect responses as 0. Domain-specific scores and a total knowledge score were calculated by summing item responses, with higher scores indicating greater knowledge.

As no validated Greek version of the DKQ was available, the instrument was translated and culturally adapted for the Cypriot ICU context. Initial translation was performed using existing Greek-language delirium-related literature [35,36] and direct adaptation from the original English version. The translated items were subsequently reviewed by two bilingual experts in critical care nursing to ensure semantic equivalence, clarity, and contextual relevance. Minor modifications were made to improve wording and ensure alignment with local clinical terminology. Although a formal forward–backward translation process was not conducted, efforts were made to preserve the conceptual meaning of all items.

### 2.5. Validity and Reliability

Content validity was assessed through expert evaluation by a panel consisting of academic faculty in critical care nursing and experienced ICU clinicians. Experts reviewed each item for relevance, clarity, and representativeness of the construct of delirium knowledge in ICU settings. Feedback focused on item wording, clinical applicability, and comprehensiveness of the domains. Minor revisions were made to improve clarity and contextual appropriateness. Overall, the instrument was considered to have satisfactory content validity for use in this study.

A pilot study was conducted with 10 ICU nurses from a hospital not included in the main sample to assess clarity, feasibility, and completion time. Participants provided feedback on item comprehension and questionnaire structure. Based on this feedback, minor wording adjustments were made to improve clarity and readability. No substantial changes to item content or structure were required. Pilot data were not included in the final analysis.

The internal consistency of the DKQ-35 was acceptable (Cronbach's  $\alpha = 0.775$ ). The ICU-specific subscale demonstrated lower internal consistency ( $\alpha = 0.663$ ), which is considered borderline acceptable. This finding may be attributed to the relatively small number of items and the multidimensional nature of the construct, as the subscale includes diverse aspects of ICU-related delirium knowledge. Similar variability in internal consistency has been reported in exploratory instruments assessing complex clinical knowledge domains. Therefore, the reliability results should be interpreted with caution.

### 2.6. Data Analysis

Data were analyzed using the IBM Statistical Package for the Social Sciences (SPSS, IBM, Armonk, NY, USA), v.29. Descriptive statistics were used to summarize demographic characteristics and knowledge and recognition scores (mean, standard deviation, frequency, and percentage). Inferential statistics included:

- Independent samples *t*-tests to compare delirium knowledge scores across groups (e.g., gender, education level, ICU experience categories).
- Chi-square tests to examine associations between categorical variables (e.g., hospital type and sedation practices).

- Correlation analysis (Pearson correlation) to explore relationships between continuous variables such as age, years of ICU experience, and knowledge scores.

ICU experience was categorized into two groups (1–4 years vs.  $\geq 5$  years) to reflect differences in clinical experience. This threshold is supported by nursing theory and empirical evidence, suggesting that progression toward higher levels of clinical proficiency and clinical reasoning occurs with increasing years of experience, particularly beyond the early years of practice [37].

Statistical significance was set at  $p < 0.05$ .

2.7. Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Cyprus National Bioethics Committee (Approval No: EEBK/EII/2025/96, date: 8 July 2025) and by the participating hospitals’ administrations. Participation was voluntary, anonymity was ensured, and no identifiable personal data were collected. Participants were informed that they could withdraw at any time without consequences.

2.8. AI-Assisted Technologies Statement

An AI-assisted language tool (ChatGPT—5.3, OpenAI, San Francisco, CA, USA) was used solely for English language editing and clarity improvement. All scientific content and final manuscript decisions were made by the authors.

3. Results

3.1. Demographic Characteristics of Participants

A total of 70 ICU nurses were included in the study. Participants were predominantly female (60.0%), with a mean age of 31.8 years (SD = 6.0). Most held a bachelor’s degree (70.0%), while 30.0% had completed postgraduate studies. Only 10.0% reported formal ICU specialization. The mean years of professional nursing experience was 8.4 (SD = 5.7), including 5.1 years (SD = 4.1) of ICU experience. The majority were employed in private hospitals within the GHS (60.0%). The demographic characteristics are summarized in Table 1.

Table 1. Demographic characteristics of ICU nurses ( $n = 70$ ).

| Categorical Variables       |              |
|-----------------------------|--------------|
| Variable Name               | <i>n</i> (%) |
| <b>Gender</b>               |              |
| Male                        | 28 (40.0)    |
| Female                      | 42 (60.0)    |
| <b>Education Level</b>      |              |
| Bachelor’s Degree           | 49 (70.0)    |
| Master’s Degree (MSc)       | 21 (30.0)    |
| <b>ICU Specialization</b>   |              |
| Yes                         | 7 (10.0)     |
| No                          | 63 (90.0)    |
| <b>Type of Hospital</b>     |              |
| Public                      | 21 (30.0)    |
| Private (GHS)               | 42 (60.0)    |
| Private (non-GHS)           | 7 (10.0)     |
| <b>Continuous Variables</b> |              |
| Variable Name               | Mean (SD)    |
| Age (years)                 | 31.79 (6.00) |
| Years of Nursing Experience | 8.40 (5.74)  |
| Years of ICU Experience     | 5.10 (4.15)  |

### 3.2. Sedation and Analgesia Practices

A written sedation or sedation–analgesia protocol was reported by 34.3% of participants. Familiarity with international sedation guidelines was generally limited, with 58.6% reporting little or no familiarity. Sedation scales were used by 44.3% of respondents, with Richmond Agitation-Sedation Scale (RASS) being the most frequently reported tool. Daily sedation interruption was applied by 61.4% of ICU nurses. Propofol was the predominant sedative agent, with 92.9% reporting very frequent use, and 77.1% identifying it as their first-line agent. Midazolam was also widely used, whereas thiopental was less frequently administered. Dexmedetomidine demonstrated moderate variability in use. Sedative agents were commonly administered in combination with analgesics. Regarding analgesics, remifentanyl (62.9%) and fentanyl (52.9%) were most frequently used, followed by morphine. Ketamine was rarely administered. Continuous neuromuscular blockade beyond short-term use was predominantly reported as occasional (55.7%).

### 3.3. Delirium Screening and Education

Only 27.1% of participants reported performing daily delirium screening. Among those who screened routinely ( $n = 10$ ), CAM-ICU was used by six nurses, while four reported using Nu-DESC. Despite limited screening implementation, 65.2% perceived delirium as a frequent occurrence in their ICU. Prevention of delirium was considered highly important, with 87.2% rating it as very or extremely important. However, only 15.7% had received formal training on delirium management. The majority (87.1%) expressed the need for further education, with face-to-face seminars being the preferred educational format (51.4%). The distribution of sedation, analgesia, and delirium management practices is summarized in Table 2.

**Table 2.** Sedation, Analgesia, and Delirium practices among ICU nurses ( $n = 70$ ).

| Variable                                  | <i>n</i> (%) |
|-------------------------------------------|--------------|
| <b>Sedation Practices</b>                 |              |
| Written sedation protocol                 | 24 (34.3)    |
| Use of sedation scale                     | 31 (44.3)    |
| Daily sedation interruption               | 43 (61.4)    |
| First-line sedative: Propofol             | 54 (77.1)    |
| Propofol (very frequent use)              | 65 (92.9)    |
| Remifentanyl (very frequent use)          | 44 (62.9)    |
| Fentanyl (very frequent use)              | 37 (52.9)    |
| Continuous NMBA (occasional use)          | 39 (55.7)    |
| <b>Delirium Screening &amp; Education</b> |              |
| Daily delirium screening                  | 19 (27.1)    |
| Perceived delirium as frequent            | 45 (65.2)    |
| Received formal training                  | 11 (15.7)    |
| Need for further education                | 61 (87.1)    |
| Preferred format: Face-to-face seminar    | 36 (51.4)    |

### 3.4. Delirium Knowledge

The knowledge levels of ICU nurses regarding delirium are presented in Table 3. Overall, moderate to high knowledge scores were observed across all domains of the Delirium Knowledge Questionnaire (DKQ), with some variability between sections.

In Part A (clinical features and symptomatology; 10 items), the mean score was 7.56 (SD = 1.68, median = 8, IQR = 3) out of 10, corresponding to 75.6% of the maximum possible score. Scores ranged from 4 to 10, with 9 nurses (12.9%) achieving the maximum score. In Part B (risk factors and causes; 11 items), the mean score was 7.53 (SD = 1.36, median = 8, IQR = 1) out of 11, corresponding to 68.5% of the maximum possible score. Observed scores

ranged from 4 to 10. This section demonstrated the lowest relative percentage of maximum score among all domains and the smallest standard deviation ( $SD = 1.36$ ), indicating comparatively lower variability in responses. In Part C (prevention and management; 14 items), the mean score was 10.63 ( $SD = 1.80$ , median = 11,  $IQR = 2$ ) out of 14, corresponding to 75.9% of the maximum possible score. Scores ranged from 5 to 14, with 2 participants achieving full marks. This domain exhibited the largest dispersion ( $SD = 1.80$ ), suggesting greater variability in knowledge related to prevention and management strategies.

**Table 3.** Domain-level analysis of Delirium knowledge scores.

| Domain              | Items (n) | Score Range | Mean (SD)    | Median (IQR) | % of Maximum Score |
|---------------------|-----------|-------------|--------------|--------------|--------------------|
| Part A Symptoms     | 10        | 0–10        | 7.56 (1.68)  | 8 (3)        | 75.6%              |
| Part B Risk Factors | 11        | 0–11        | 7.53 (1.36)  | 8 (1)        | 68.5%              |
| Part C Prevention   | 14        | 0–14        | 10.63 (1.80) | 11 (2)       | 75.9%              |
| DKQ-ICU             | 10        | 0–10        | 8.40 (1.43)  | 9 (1)        | 84.0%              |

The ICU-specific section (DKQ-ICU; 10 items) demonstrated the highest relative performance, with a mean score of 8.40 ( $SD = 1.43$ , median = 9,  $IQR = 1$ ), corresponding to 84.0% of the maximum possible score. Scores ranged from 4 to 10, with 16 participants (22.9%) achieving the maximum score. Variability in this section was moderate ( $SD = 1.43$ ), falling between Parts B and C.

Comparatively, the highest performance was observed in the ICU-specific domain, followed by Parts C and A, while Part B demonstrated the lowest relative performance. In terms of dispersion, knowledge variability was greatest in Part C and lowest in Part B.

### 3.5. Predictors of Delirium Knowledge Among ICU Nurses

Independent samples *t*-tests were conducted to examine differences in overall delirium knowledge scores according to selected demographic and professional characteristics. Nurses who had previously attended delirium-related training demonstrated significantly higher knowledge scores compared with those without such training ( $37.55 \pm 2.91$  vs.  $33.47 \pm 4.26$ ,  $p = 0.003$ ). Gender differences were also observed, with female nurses demonstrating significantly higher delirium knowledge scores compared with male nurses ( $35.33 \pm 3.79$  vs.  $32.29 \pm 4.49$ ,  $p = 0.003$ ). In contrast, no significant differences in overall knowledge scores were observed according to hospital type ( $33.86 \pm 4.36$  vs.  $34.22 \pm 4.35$ ,  $p = 0.747$ ) or educational level ( $34.62 \pm 4.64$  vs.  $33.90 \pm 4.21$ ,  $p = 0.526$ ). Additionally, when ICU experience was categorized into two groups (1–4 years vs.  $\geq 5$  years), nurses with  $\geq 5$  years of ICU experience demonstrated significantly higher scores in the prevention domain of the questionnaire compared with those with 1–4 years of experience ( $10.00 \pm 1.98$  vs.  $11.11 \pm 1.52$ ,  $p = 0.011$ ) (Table 4). No significant differences were observed in the other knowledge domains.

Chi-square tests were performed to examine associations between categorical variables related to ICU practices and professional characteristics. Significant associations were identified between hospital type and sedation-related clinical practices (Table 5). The use of sedation scales was reported significantly more frequently in public ICUs compared with private ICUs (90.5% vs. 24.5%,  $p < 0.001$ ). Similarly, hospital type was significantly associated with the choice of first-line sedative agent, with propofol more commonly reported in public ICUs and midazolam more frequently reported in private ICUs (95.2% vs. 69.4% and 4.8% vs. 30.6%,  $p = 0.018$ ). No statistically significant associations were

observed between hospital type and the presence of written sedation protocols or the implementation of daily sedation interruption. Additionally, no association was identified between gender and educational level.

**Table 4.** Delirium knowledge domain scores according to ICU experience (1–4 years vs.  $\geq 5$  years).

| Domain        | Mean (1–4 yrs) SD | Mean ( $\geq 5$ yrs) SD | <i>p</i> -Value |
|---------------|-------------------|-------------------------|-----------------|
| <b>Part A</b> |                   |                         |                 |
| Symptoms      | 7.61 (1.72)       | 7.43 (1.70)             | 0.681           |
| <b>Part B</b> |                   |                         |                 |
| Risk Factors  | 7.47 (1.27)       | 7.57 (1.52)             | 0.784           |
| <b>Part C</b> |                   |                         |                 |
| Prevention    | 10.00 (1.98)      | 11.11 (1.52)            | 0.011 *         |
| DKQ-ICU       | 8.68 (1.07)       | 8.07 (1.76)             | 0.078           |

\*  $p < 0.05$ .

**Table 5.** Association between hospital type and sedation practices in ICU nurses.

| Variable                    | Public Hospitals (%) | Private Hospitals <sup>†</sup> (%) | <i>p</i> -Value |
|-----------------------------|----------------------|------------------------------------|-----------------|
| Sedation scale use          | 90.5                 | 24.5                               | <0.001 **       |
| Daily sedation interruption | 76.2                 | 55.1                               | 0.097           |
| Propofol first line         | 95.2                 | 69.4                               |                 |
| Midazolam first line        | 4.8                  | 30.6                               | 0.018           |

<sup>†</sup> GHS and non-GHS; \*\*  $p < 0.001$ .

Correlation analyses were conducted to examine the relationship between continuous variables and overall delirium knowledge scores. Neither years of ICU experience ( $p = 0.746$ ) nor age ( $p = 0.622$ ) were significantly associated with overall knowledge scores. Furthermore, ICU experience did not differ significantly between male and female nurses when analyzed as a continuous variable ( $p = 0.315$ ).

A multiple linear regression analysis was conducted (Table 6) to further examine the independent predictors of total delirium knowledge. The results confirmed that only gender and delirium-related training were statistically significant predictors of knowledge. Specifically, gender demonstrated a positive association with knowledge scores ( $\beta = 3.493$ ,  $p < 0.001$ ), indicating that female nurses had higher knowledge levels compared to male nurses. Delirium-related training showed a negative association ( $\beta = -4.674$ ,  $p < 0.001$ ), assuming that higher values correspond to lower educational attainment, the result suggests that nurses with higher education demonstrated greater knowledge. Both variables remained statistically significant ( $p < 0.001$ ), indicating their independent contribution to delirium knowledge.

**Table 6.** Multivariable Analysis of Predictors of Delirium Knowledge.

| Variable          | Unstandardized Coefficients B | <i>t</i> -Statistic | Sig. Value | Tolerance | VIF   |
|-------------------|-------------------------------|---------------------|------------|-----------|-------|
| Constant          | 37.139                        | 14.358              | 0.000      |           |       |
| Gender            | 3.493                         | 3.803               | 0.000      | 0.984     | 1.017 |
| Delirium Training | −4.674                        | −3.780              | 0.000      | 0.984     | 1.017 |

Dependent Variable: Delirium Training. Independent Variables: Gender (1: man, 2: woman), Training (1: Received training, 2: Not received training).

#### 4. Discussion

Within the patient safety framework, delirium represents a preventable and modifiable complication when early detection and multicomponent interventions are implemented. In the present study, delirium prevention was perceived as highly important, with 87.2% of participants rating it as very or extremely important. This finding aligns with previous studies reporting high awareness of delirium but inconsistent implementation of screening practices [38]. However, this awareness does not consistently translate into clinical practice [39]. Despite the high perceived importance observed in our study, the proportion of nurses reporting routine daily delirium screening was notably low (27.1%). Although 65.2% perceived delirium as frequent in their ICU, routine structured assessment using validated tools such as CAM-ICU or Nu-DESC was inconsistently implemented. This discrepancy highlights a knowledge–practice gap, which has been reported internationally [20,21]. Failure to systematically assess delirium may delay recognition of hypoactive presentations, a commonly underdiagnosed subtype associated with poor outcomes [40].

Sedation practices in this study demonstrated partial alignment with current recommendations. The predominant use of propofol and the reported application of daily sedation interruption by 61.4% of nurses are consistent with evidence favoring light sedation strategies [1]. However, only one-third (34.3%) reported the presence of a written sedation protocol, and familiarity with international guidelines was limited. The use of structured protocols and standardized assessment tools is associated with reduced delirium incidence and improved outcomes [2,41]. Limited protocol use may contribute to practice variability and increased risk of preventable harm [42]. Studies from countries such as Greece, Poland, and the Netherlands have identified comparable barriers, including limited training, absence of standardized protocols, and variability in clinical practice [20,22,31]. The relatively low implementation of sedation protocols observed in this study may indicate additional structural limitations at the institutional level, particularly in smaller healthcare systems. Addressing these gaps requires not only educational interventions but also system-level strategies, including the implementation of standardized protocols, integration of delirium assessment tools into routine workflows, and strengthening of guideline dissemination and adherence.

Overall delirium knowledge levels were moderate to high, with total domain scores ranging from 68.5% to 84.0%. The highest performance was observed in the ICU-specific section (84%), suggesting that nurses may be more familiar with context-specific aspects of delirium. Conversely, knowledge related to risk factors and causes (Part B) demonstrated the lowest relative performance (68.5%). Knowledge of risk factors is essential for prevention and risk stratification [1,43]. Lower performance in this domain may partially explain inconsistencies in screening and prevention practices. Knowledge of clinical features alone may not translate into proactive risk mitigation. This may result in delayed recognition and suboptimal interventions [31]. Numerous studies highlight this deficit, indicating that many intensive care unit nurses lack comprehensive knowledge regarding delirium, its assessment, and management [31,44,45].

A key finding of this study is that prior delirium-related training was a significant predictor of knowledge scores. This finding aligns with previous international studies demonstrating that targeted educational interventions significantly improve delirium recognition and management competencies [26,32,46]. Clinical experience may also contribute to improved understanding of prevention strategies. Previous research has similarly highlighted the role of clinical experience in enhancing nurses' competence in delirium management, particularly in areas related to prevention and non-pharmacological interventions [31,32]. In a recent study, prior delirium training was the strongest predictor of both knowledge and positive attitudes [47]. The high proportion of nurses expressing the

need for further education (87.1%) indicates awareness of knowledge gaps and readiness for professional development. From a systems perspective, this represents an opportunity for institutional quality improvement initiatives.

A statistically significant difference in knowledge scores between male and female nurses was observed in this study. Although previous research suggests that female nurses may report greater engagement in continuing education and evidence-based practice activities [48,49], the factors contributing to this difference were not specifically examined in the current study and should be interpreted with caution.

Hospital type was associated with sedation practices. Sedation scales were used more frequently in public ICUs compared with private ICUs. The use of validated tools such as the RASS is recommended in international guidelines [1]. Hospital type was also associated with the choice of first-line sedative agent, with propofol more commonly reported in public ICUs and midazolam more frequently used in private ICUs ( $p = 0.018$ ). This variability may reflect differences in institutional protocols and prescribing practices. Current guidelines recommend propofol or dexmedetomidine over benzodiazepines due to the increased risk of delirium associated with agents such as midazolam [1], and similar inter-hospital variability in sedation practices has been reported previously [2,41].

A key finding is the coexistence of moderate-to-high knowledge levels with low rates of systematic screening, well documented also internationally [20,21,50]. Barriers may include workload pressures, lack of institutional protocols, insufficient interdisciplinary coordination, absence of performance monitoring and delirium care difficulties [37]. These findings indicate that knowledge alone is insufficient, and structured implementation strategies are required to translate evidence into practice [2]. Embedding delirium monitoring within electronic health records, integrating sedation and delirium checklists into routine workflow, and strengthening interprofessional collaboration may enhance translation of knowledge into practice.

This study has some limitations that should be considered when interpreting the findings. First, although the knowledge assessment was based on the Delirium Knowledge Questionnaire (DKQ), a formally validated Greek-language version specifically tailored to ICU nurses in Cyprus is not currently available. The instrument used in this study was linguistically adapted and reviewed for content validity; however, a full cross-cultural validation process was not conducted. Additionally, the internal consistency of the ICU-specific subscale was borderline acceptable and these results related to this subscale should be interpreted with caution. Second, the cross-sectional design precludes causal inferences regarding the relationship between knowledge levels and clinical practices. Finally, the use of self-reported data may be subject to response bias, potentially overestimating adherence to recommended practices.

Future research should focus on formal psychometric validation of a Greek-language delirium knowledge instrument and on interventional studies evaluating the impact of structured education on patient safety outcomes in critical care.

## 5. Conclusions

In conclusion, this study demonstrates that although ICU nurses in Cyprus exhibit moderate to high knowledge regarding delirium, systematic screening and protocolized management remain limited. Prior training significantly enhances knowledge, underscoring the importance of structured educational initiatives. Bridging the knowledge–practice gap through evidence-based protocols, continuous training, and organizational support is essential for strengthening patient safety in critical care environments. From a patient safety perspective, delirium prevention and early detection represent modifiable targets within ICU systems. Given that delirium is associated with increased mortality and long-term

cognitive decline, enhancing nurses' competence in delirium management has important clinical implications beyond the ICU stay. While not directly assessed in this study, improved delirium management may contribute to better long-term patient outcomes and more efficient healthcare delivery. In smaller healthcare systems such as Cyprus, efforts toward standardization of delirium assessment practices could further strengthen patient safety.

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## Abbreviations

The following abbreviations are used in this manuscript:

|         |                                                                      |
|---------|----------------------------------------------------------------------|
| CAM-ICU | Confusion Assessment Method for the ICU                              |
| DKQ     | Delirium Knowledge Questionnaire                                     |
| GHS     | General Healthcare System                                            |
| ICU     | Intensive Care Unit                                                  |
| Nu-DESC | Nursing Delirium Screening Scale                                     |
| PADIS   | Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption |
| RASS    | Richmond Agitation Sedation Scale                                    |
| WHO     | World Health Organization                                            |

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## Article

# Inter-Rater Agreement Between a Trained Nurse and Physicians in FAST Examination of Trauma Patients: A Pilot Study in the Emergency Department

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## Abstract

**Background/Objectives:** Trauma management in emergency departments (EDs) requires rapid and reliable diagnostic tools. The Focused Assessment with Sonography in Trauma (FAST) is a bedside ultrasound examination used for the early detection of free fluid in the intraperitoneal cavity, pericardium, and pleural spaces. Expanding FAST use to trained emergency nurses may support timely bedside evaluation in high-demand settings. However, data on agreement with physicians remains limited. This study aimed to evaluate the inter-rater agreement between a trained emergency nurse and physicians in performing FAST and to explore the diagnostic accuracy of nurse-performed FAST compared with computed tomography (CT). **Methods:** A prospective pilot observational agreement study was conducted between October and December 2023 in the ED of a general hospital in Cyprus. FAST examinations were independently performed by a nurse trained in FAST and by physicians from the radiology department. Four anatomical areas were assessed: right upper quadrant (RUQ), left upper quadrant (LUQ), subxiphoid-pericardial area (SUPH), and suprapubic area (BLADDER). Findings were recorded independently to promote blinding. Diagnostic performance of nurse-performed FAST was explored in a subset of patients undergoing CT. **Results:** The sample included 68 trauma patients, of whom 58 underwent FAST by both the nurse and the radiologists and were included in the inter-rater agreement analysis. Fluid was detected in four patients (6.9%) in the RUQ area and in one patient (1.7%) in both the LUQ and SUPH regions, while no positive findings were recorded in the BLADDER area. Agreement in the RUQ area was 98.3% (Cohen's kappa = 0.85,  $p < 0.001$ ) while agreement was observed in all cases in the SUPH region (100%, Cohen's kappa = 1.00,  $p < 0.001$ ), although this finding was based on a single positive case. High observed agreement was also noted in LUQ (98.3%) and BLADDER regions; however, Cohen's kappa could not be reliably estimated in these regions due to limited variability and the very small number of positive cases. In a subgroup of patients who underwent CT ( $n = 23$ ), as well as in an additional Trauma Team subgroup ( $n = 10$ ), diagnostic accuracy estimates were 100% for sensitivity and specificity; however, these estimates were based on a very small number of positive cases (only two positive cases in each subgroup) and were associated with wide confidence intervals. **Conclusions:** This pilot study suggests that, under specific training conditions, a trained emergency nurse may achieve a high level of agreement with physician assessments when performing FAST. The findings regarding diagnostic accuracy are preliminary and should be interpreted

with caution due to the small sample size and low number of positive cases. Further studies with larger samples and multiple operators are required to confirm these findings and to evaluate their clinical implications. Future research is also needed to determine whether nurse-performed FAST may contribute to improved patient safety and emergency department workflow.

**Keywords:** diagnostic accuracy; diagnostic ultrasound; emergency department; emergency nurse; emergency ward; focused assessment with sonography in trauma (FAST); inter-rater agreement; nurse-performed ultrasound; point-of-care ultrasound (POCUS); trauma

## 1. Introduction

Trauma is one of the most common reasons for patients to visit the Emergency Department (ED) and is associated with increased morbidity and mortality rates. Timely and accurate identification of trauma-related injuries is critical for improving patient outcomes, particularly in cases of haemodynamic instability. Delayed diagnosis of intra-abdominal or pericardial effusion can lead to rapid deterioration of the patient and increased risk of mortality [1].

In abdominal and chest trauma, computed tomography (CT) and bedside ultrasound (Point-of-Care Ultrasound, POCUS) are the basic non-invasive imaging tools used in emergency medicine to identify injuries [2]. Although CT is the reference standard for assessing trauma patients, the need to transport often hemodynamically unstable patients, exposure to ionizing radiation, the duration of the examination and its cost limit its use as a first-line method. In contrast, POCUS can be performed immediately in the resuscitation area, simultaneously with the provision of care, contributing to rapid clinical decision-making [2,3].

The use of ultrasound to detect free fluid in trauma patients began in the 1980s in Europe by surgeons, and Focused Assessment with Sonography in Trauma (FAST) was established as a POCUS examination for detecting free fluid in trauma patients in the 1990s [4]. FAST is used to assess the presence of free fluid in the intraperitoneal cavity, pericardium and pleural spaces [5] and is incorporated into the Advanced Trauma Life Support (ATLS) algorithm [6] as a rapid, non-invasive, and radiation-free tool in trauma assessment [7]. However, the literature highlights significant variation in the sensitivity, specificity, positive and negative predictive values of FAST [8], making it necessary, in selected cases, to perform a supplementary CT [9].

FAST examination is considered a standard of care in the initial evaluation of trauma patients [7] and has been shown to be effective when performed rapidly, provided that standardized training and practice programs are implemented [8,10–12]. Traditionally, FAST examinations are performed by physicians. However, the American College of Emergency Physicians recommends that FAST may also be performed by other healthcare professionals, including emergency nurses, particularly in the ED, following appropriate training [13].

Studies evaluating the ability of non-physicians to perform FAST are limited [13–16], and the available data on nurses working in the ED are relatively scarce [17,18]. Furthermore, existing evidence is heterogeneous, with variability in study design, training approaches, and reference standards [17,18]. The literature has primarily focused on diagnostic performance and feasibility, while less emphasis has been placed on inter-rater agreement between nurses and physicians, especially using independently performed assessments within the same clinical setting.

In this context, the aim of this study was to evaluate the inter-rater agreement between a trained emergency care nurse and physicians in performing and interpreting FAST examinations in trauma patients in the ED. A secondary, exploratory objective was to assess the diagnostic accuracy of FAST performed by the nurse by comparison with CT findings.

This study was conceptually guided by the assumption that a trained emergency care nurse could achieve a high level of agreement with physicians and demonstrate acceptable diagnostic performance when performing and interpreting FAST examinations.

## 2. Materials and Methods

### 2.1. Design and Setting

This is a pilot, prospective observational agreement study conducted at the ED of Nicosia General Hospital, the largest hospital in Cyprus. This ED, with a capacity of 23 beds, serves approximately 150–200 patients daily and has a Trauma Team. This Trauma Team was created based on the guidelines of the American College of Surgeons [19], adapted to the environment of Cyprus, and includes a specialist surgeon, two trainee surgeons and three nurses from the ED. The Trauma Team is activated after notification from the ambulance transporting the injured patient, based on specific criteria (see below for participant inclusion criteria). Convenience sampling was employed and included patients who met the inclusion criteria, during the periods when the nurse-researcher was available at the ED. Given the pilot nature of the study, no formal sample size calculation was performed. The sample size was based on feasibility and the number of eligible patients presenting during the study period. The study was conducted between 1 October and 31 December 2023.

### 2.2. Participants

#### Study Inclusion Criteria

The study sample consisted of injured patients who attended the ED and met the following criteria:

- Adults (>18 years old);
- Presence of injury mechanism resulting from a fall, trauma, injury, or traffic accident;
- A referral for FAST was issued by the ED physician;
- A referral for FAST was issued by the Trauma Team in the following cases [19]:
  - ✓ Confirmed systolic blood pressure < 90 mmHg;
  - ✓ Penetrating gunshot wounds to the neck, chest or abdomen;
  - ✓ Patients who have been intubated in the field and are being transported directly to the trauma center;
  - ✓ Patients with respiratory distress or need for an emergency airway;
  - ✓ Patients transferred from another hospital with ongoing respiratory distress (except those already intubated and respiratory stable);
  - ✓ Glasgow Coma Scale < 9 with injury mechanism due to trauma;
  - ✓ Transport of a patient from another hospital who needs continuous blood transfusion;
  - ✓ At the discretion of the emergency physician.
- Signed consent from the patient or their relatives.

Exclusion criteria were:

- Life-threatening conditions upon patient arrival, such as overt major external bleeding, clinically apparent traumatic brain injury, and gastrointestinal bleeding (to avoid delaying patient management);

- Patients with a high body mass index > 40 and pregnant women (due to the difficulty of obtaining accurate images);
- Not knowing Greek or English (due to not understanding the consent form).

### 2.3. Ultrasound Equipment and Data Recording

The data collection tool used in the study was the Butterfly iQ+ portable ultrasound device (Butterfly Network Inc., Guilford, CT, USA). This is a portable device consisting of an ultrasound probe that connects to the screen of a smartphone or tablet. The images from the ultrasound scan were stored in a secure cloud environment accessible only to the device owner.

#### Description of the FAST Protocol

- FAST is performed by placing the ultrasound probe in four predetermined ultrasound windows, with the aim of rapidly detecting free fluid in the intraperitoneal, pericardial cavity, and pleural spaces typically within 5 min.
- The windows include:
  - ✓ Abdomen right upper quadrant (RUQ): examination of the hepatocolic angle (Morrison's pouch) and the diaphragm to detect free fluid between the liver and right kidney.
  - ✓ Abdomen left upper quadrant (LUQ): examination of the splenorenal angle and diaphragm to detect free fluid between the spleen and left kidney.
  - ✓ Subxiphoid-pericardial area (SUPH): examination of the pericardial space to detect pericardial effusion.
  - ✓ Suprapubic view (BLADDER): examination of the pelvis to detect free fluid in the bladder and Douglas space [20].

### 2.4. Training of the Nurse Who Collected the Data

Data collection was performed by a nurse with 11 years of clinical experience, 7 of which were in the ED. The nurse was a postgraduate student in Advanced Emergency and Intensive Care Nursing and had completed a structured training program in POCUS and FAST, which included theoretical instruction, successful written examinations and supervised clinical training. The total duration of the training was 81 h, 20 of which were online training, including 6 months of clinical training under the supervision of a specialist physician.

During the training period, the nurse-performed FAST examinations as part of supervised clinical practice. However, a predefined minimum number of supervised examinations, formal competency thresholds, and standardized assessment criteria were not specified as part of the study protocol. In addition, no formal assessment of interobserver agreement was conducted prior to study initiation beyond the completion of the training and supervised clinical practice.

### 2.5. Description of the Sample Collection and FAST Procedure

#### 2.5.1. Procedure for Inclusion and Performance of the Examination

All ED physicians were informed about the study and agreed to the data collection procedure. For each injured person who met the inclusion criteria, the ED physicians issued a referral note for the FAST to be performed, which included the patient's unique admission number.

The nurse then approached the patient (or their relatives, if the patient was unable to communicate), provided relevant information and offered participation in the study.

After consent was given, the patient was enrolled in the study with a coded number to ensure anonymity.

The nurse-performed the FAST according to the predefined four-window protocol, with a total duration not exceeding 5 min. A positive FAST was defined as the presence of free fluid in any of the four ultrasound windows.

#### 2.5.2. Ensuring Independence and Blinding

After the nurse completed the FAST examination, the findings were immediately recorded on a form marked 'N' (Nurse) and handed to the on-call physician at the ED, who kept them in a locked area. The ultrasound images were stored in the nurse's secure electronic environment, without access by the second examiner.

The patient then underwent a FAST examination by a radiologist. FAST examinations were performed by ten radiologists as part of routine clinical practice. Although all were qualified specialists, their level of experience in FAST was not formally standardized or recorded. The radiologist was aware that a prior FAST examination had been performed but did not have access to the nurse's findings or images. Similarly, the nurse was not informed of the radiologist's findings. The radiologist did not have access to the results of other imaging tests (e.g., X-ray or CT) at the time of the FAST examination and was only aware of the type of injury.

The radiologist's findings were recorded on the referral form issued by the ED physician and returned to the ED physician on duty. A copy of this form, marked 'R' (Radiologist), was kept in the same secure area. Only ED physicians acting as independent data collectors had access to this locked area.

These procedures were implemented to promote independent recording of findings and to support blinding by minimizing access to prior results between examiners. FAST examinations were performed sequentially as part of routine clinical practice; however, given the rapid nature of the examination, the time interval between assessments was expected to be short, although it was not systematically recorded or formally analyzed.

#### 2.5.3. Management of Severely Injured Patients and CT Utilization

In patients requiring Trauma Team activation, the nurse-performed the FAST examination in the presence of the Trauma Team's surgeons. In these cases, no second examination was performed by a radiologist. Instead, patients were transferred directly for CT imaging of the abdomen and lower chest, in accordance with routine clinical practice.

CT findings were used as the reference standard for evaluating the diagnostic accuracy of the nurse-performed FAST. CT images were interpreted independently by the radiologist without access to the recorded FAST findings, as part of routine clinical practice. The CT findings were collected and recorded by the ED physician.

CT imaging was also performed in selected patients outside Trauma Team activation, based on clinical judgment and standard trauma management protocols, and was not systematically applied to all patients.

#### 2.5.4. Collection of Demographic and Clinical Data

Patient gender, age and type of injury were recorded from medical records. The study was completed on 31 December 2023, and the findings were independently compared by two ED physicians who were not involved in the ultrasound examinations.

FAST was performed following referral by the attending ED physician and did not affect patient clinical management. Ultrasound findings recorded for study purposes were not made available to the trauma or surgical teams for decision-making, and patient management was based on standard clinical assessment and imaging pathways. The

examination was rapid, non-invasive, and did not delay the implementation of other diagnostic or therapeutic interventions, ensuring that ED operations were not disrupted.

### 2.6. Ethical Issues

The study was approved by the Cyprus National Bioethics Committee (Ref. No.: 2022.01.135) and was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained prior to study participation from all participants or, where patients were unable to communicate, from their legally authorized representatives. The consent form was available in Greek and English.

To ensure data protection, the patient's name was replaced with a number. This number was unique for each patient and stored in the database. Access to the patient database and ultrasound images was restricted to the nurse-researcher and the study's scientific coordinator.

This study was not prospectively registered in a clinical trial registry.

### 2.7. Statistical Analysis

Quantitative variables are presented as mean and standard deviation, while categorical variables are presented as absolute (n) and relative (%) frequencies.

Inter-rater agreement between the nurse and the physician for the assessment of the presence or absence of free fluid was evaluated using Cohen's kappa ( $\kappa$ ) for each ultrasound region (RUQ, LUQ, SUPH, BLADDER). In cases of lack of variability (i.e., when all findings belonged to the same category), kappa could not be calculated. Given the low prevalence of positive findings, kappa estimates were interpreted with caution, as agreement measures may be affected by limited variability and prevalence effects.

The diagnostic accuracy of nurse-performed FAST was assessed by comparing the findings with CT, which was used as the reference standard. Sensitivity, specificity, and positive and negative predictive values were calculated, along with their corresponding 95% confidence intervals (CI).

The two-sided level of statistical significance was set at 0.05. Statistical analysis was performed using IBM SPSS 21.0 (Statistical Package for Social Sciences) software.

## 3. Results

### 3.1. Patient Characteristics

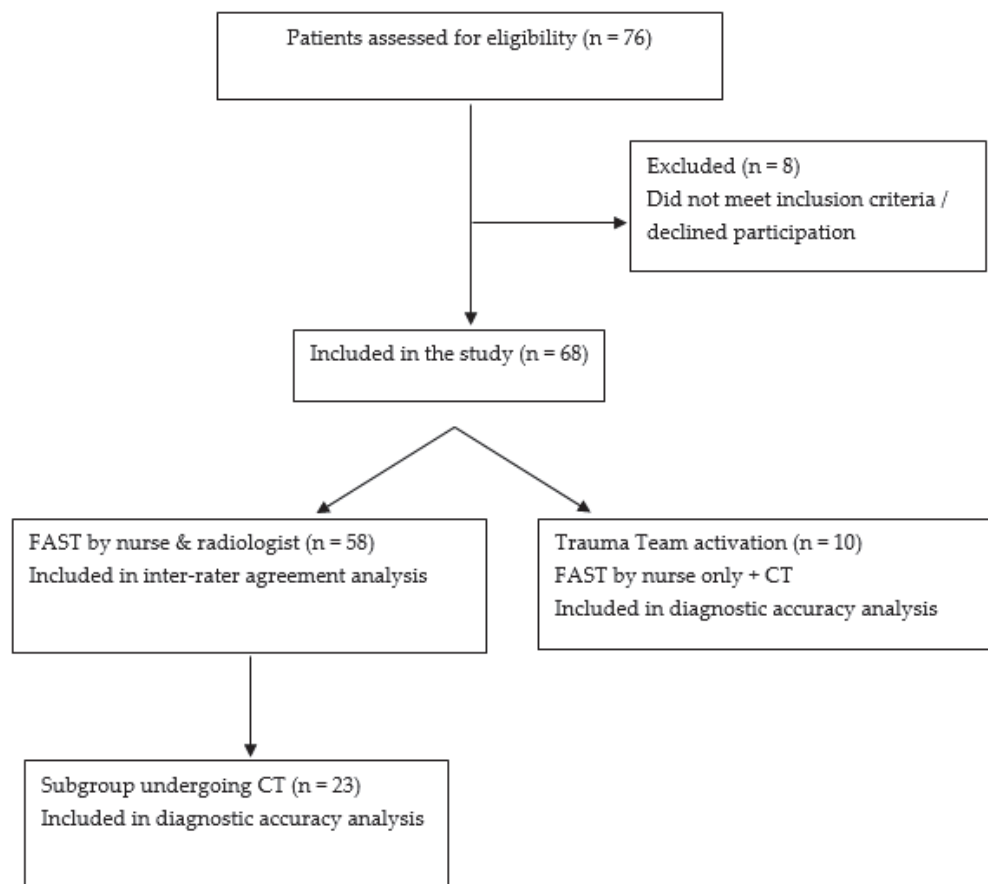
During the study period, a total of 76 injured patients were assessed for participation in the study. Of these, 8 were excluded because they did not meet the inclusion criteria or declined participation. The final study sample consisted of 68 patients, whose demographic and clinical characteristics are presented in Table 1. Of these, 58 patients underwent FAST performed by both the nurse and the radiologists, and constituted the sample for the inter-rater agreement analysis.

Of these 58 patients, 23 also underwent CT, based on clinical indications and physician judgment, in accordance with routine trauma management protocols. In addition, 10 patients requiring Trauma Team activation underwent FAST performed only by the nurse, followed by CT, without a second examination by a radiologist, in accordance with clinical practice.

In total, 33 patients underwent CT (23 from the agreement subgroup and 10 from the Trauma Team subgroup) and were included in the diagnostic accuracy analysis of nurse-performed FAST (Figure 1).

**Table 1.** Demographic and clinical characteristics of patients (N = 68).

| Variable                  | Value       |
|---------------------------|-------------|
| Age (years)               |             |
| Mean (Standard Deviation) | 49.3 (23.1) |
| Minimum–Maximum           | 19–93       |
| Gender, n (%)             |             |
| Men                       | 41 (60.3)   |
| Women                     | 27 (39.7)   |
| Age groups, n (%)         |             |
| <40                       | 28 (41.2)   |
| 40–60                     | 16 (23.5)   |
| >60                       | 24 (35.3)   |
| Type of injury, n (%)     |             |
| Traffic accidents         | 40 (58.8)   |
| Falls                     | 25 (36.8)   |
| Beatings                  | 3 (4.4)     |

**Figure 1.** Flow diagram of patient inclusion and analysis.

### 3.2. Overall Distribution of Findings by Region and Examiner (N = 58)

The distribution of the presence or absence of free fluid by anatomical region and examiner is presented in Table 2. In the RUQ region, fluid was detected in 3 patients (5.2%) by the nurse and in 4 patients (6.9%) by the radiologist. In the LUQ region, the nurse reported no positive findings, while the radiologist detected fluid in one patient (1.7%). In the SUPH region, both examiners identified fluid in one patient (1.7%). Finally, in the BLADDER region, no positive findings were recorded by either examiner. Overall, positive findings were limited in all anatomical regions.

**Table 2.** Distribution of findings by anatomical region according to the radiologist's and nurse's assessment (N = 58). Data are presented as n (% of total).

| Anatomical Region | Absence of Fluid (Radiologist) | Absence of Fluid (Nurse) | Presence of Fluid (Radiologist) | Presence of Fluid (Nurse) |
|-------------------|--------------------------------|--------------------------|---------------------------------|---------------------------|
| RUQ               | 54 (93.1)                      | 55 (94.8)                | 4 (6.9)                         | 3 (5.2)                   |
| LUQ               | 57 (98.3)                      | 58 (100)                 | 1 (1.7)                         | 0 (0)                     |
| SUPH              | 57 (98.3)                      | 57 (98.3)                | 1 (1.7)                         | 1 (1.7)                   |
| BLADDER           | 58 (100)                       | 58 (100)                 | 0 (0)                           | 0 (0)                     |

### 3.3. Inter-Rater Agreement (N = 58)

A total of 58 patients underwent FAST performed by both the nurse and the radiologist and were included in the inter-rater agreement analysis. Agreement between examiners was assessed using kappa for the presence or absence of free fluid across four anatomical regions: RUQ, LUQ, SUPH and BLADDER.

Inter-rater agreement by anatomical region is presented below.

#### 3.3.1. Inter-Rater Agreement for the RUQ Region (N = 58)

The results of inter-rater agreement for the RUQ region are presented in Table 3. Of the 58 patients who underwent FAST by both examiners, agreement was observed in 57 cases (98.3%). Specifically, both examiners recorded the absence of fluid in 54 patients (93.1%) and the presence of fluid in 3 patients (5.2%). In one case (1.7%), disagreement was observed, with the nurse recording the absence of fluid and the radiologist recording the presence of fluid.

**Table 3.** Inter-rater agreement for FAST in the RUQ region (N = 58). Data are presented as n (% of total).

| Examiner                 | Radiologist: Absence of Fluid | Radiologist: Presence of Fluid | Total     |
|--------------------------|-------------------------------|--------------------------------|-----------|
| Nurse: Absence of fluid  | 54 (93.1)                     | 1 (1.7)                        | 55 (94.8) |
| Nurse: Presence of fluid | 0 (0)                         | 3 (5.2)                        | 3 (5.2)   |
| Total                    | 54 (93.1)                     | 4 (6.9)                        | 58 (100)  |

Kappa for the RUQ region was 0.85 ( $p < 0.001$ ). However, this estimate was based on a small number of positive cases ( $n = 4$ ), with only one discordant result, and should therefore be interpreted with caution.

#### 3.3.2. Inter-Rater Agreement for the LUQ Region (N = 58)

Agreement for the LUQ region is presented in Table 4. Of the 58 patients, observed agreement for absence of fluid was 98.3% (57 cases). In one case (1.7%), the radiologist recorded the presence of fluid, while the nurse recorded its absence. No cases were recorded in which the nurse reported the presence of fluid.

**Table 4.** Inter-rater agreement for FAST in the LUQ region (N = 58). Data are presented as n (% of total).

| Examiner                 | Radiologist: Absence of Fluid | Radiologist: Presence of Fluid | Total    |
|--------------------------|-------------------------------|--------------------------------|----------|
| Nurse: Absence of fluid  | 57 (98.3)                     | 1 (1.7)                        | 58 (100) |
| Nurse: Presence of fluid | 0 (0)                         | 0 (0)                          | 0 (0)    |
| Total                    | 57 (98.3)                     | 1 (1.7)                        | 58 (100) |

Due to the lack of variability (i.e., absence of positive findings by the nurse), kappa could not be reliably estimated for the LUQ region.

### 3.3.3. Inter-Rater Agreement for the SUPH Region (N = 58)

Inter-rater agreement for the SUPH region is presented in Table 5. Of the 58 patients, agreement between the two examiners was observed in all cases (100%). Specifically, both examiners recorded the absence of fluid in 57 patients (98.3%) and the presence of fluid in one patient (1.7%), with no cases of disagreement. Kappa was 1.00 ( $p < 0.001$ ), indicating complete agreement between the examiners, although this finding was based on a single positive case and should therefore be interpreted with caution.

**Table 5.** Inter-rater agreement for FAST in the SUPH region (N = 58). Data are presented as n (% of total).

| Examiner                 | Radiologist:<br>Absence of Fluid | Radiologist:<br>Presence of Fluid | Total     |
|--------------------------|----------------------------------|-----------------------------------|-----------|
| Nurse: Absence of fluid  | 57 (98.3)                        | 0 (0)                             | 57 (98.3) |
| Nurse: Presence of fluid | 0 (0)                            | 1 (1.7)                           | 1 (1.7)   |
| Total                    | 57 (98.3)                        | 1 (1.7)                           | 58 (100)  |

### 3.3.4. Inter-Rater Agreement for the BLADDER Region (N = 58)

Inter-rater agreement for the BLADDER region is presented in Table 6. Both examiners recorded absence of fluid in all 58 patients (100%), with no cases of fluid presence or disagreement.

**Table 6.** Inter-rater agreement for FAST in the BLADDER region (N = 58). Data are presented as n (% of total).

| Examiner                 | Radiologist:<br>Absence of Fluid | Radiologist:<br>Presence of Fluid | Total    |
|--------------------------|----------------------------------|-----------------------------------|----------|
| Nurse: Absence of fluid  | 58 (100)                         | 0 (0)                             | 58 (100) |
| Nurse: Presence of fluid | 0 (0)                            | 0 (0)                             | 0 (0)    |
| Total                    | 58 (100)                         | 0 (0)                             | 58 (100) |

Due to the lack of variability (i.e., all findings belonged to the same category), kappa could not be reliably estimated for the BLADDER region.

Overall, while observed agreement was high across regions, these estimates should be interpreted with caution, as the very low prevalence of positive findings and the small number of events limit the stability and interpretability of agreement measures.

### 3.4. Verification of Diagnostic Accuracy of Nurse-Performed FAST

In 23 patients, FAST was performed by both the nurse and the radiologists, and CT was also performed. These patients were included in the subgroup of 58 patients for whom the inter-rater agreement was assessed. In this subgroup, the diagnostic accuracy of nurse-performed FAST was evaluated using CT as the reference standard. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated (Table 7).

**Table 7.** Diagnostic accuracy of nurse-performed FAST compared with computed tomography (reference standard) (N = 23). Data are presented as n.

| Examiner |                   | CT Findings      |                   | Total |
|----------|-------------------|------------------|-------------------|-------|
|          |                   | Absence of Fluid | Presence of Fluid |       |
| Nurse    | Absence of fluid  | 21               | 0                 | 21    |
|          | Presence of fluid | 0                | 2                 | 2     |
|          | Total             | 21               | 2                 | 23    |

Sensitivity was 100% (95% CI 15.81–100%), specificity was 100% (95% CI 83.89–100%), positive predictive value was 100% (95% CI 15.81–100%), and negative predictive value was 100% (95% CI 83.89–100%).

However, these estimates are based on a very small number of positive cases and are associated with wide confidence intervals.

In 10 additional patients requiring Trauma Team activation, FAST was performed only by the nurse in the presence of the Trauma Team's surgeons, followed by CT. In this subgroup, the diagnostic accuracy of nurse-performed FAST was also assessed (Table 8). Sensitivity was 100% (95% CI 15.81–100%), specificity was 100% (95% CI 63.1–100%), positive predictive value was 100% (95% CI 15.81–100%) and negative predictive value was 100% (95% CI 69.15–100%).

**Table 8.** Diagnostic accuracy of nurse-performed FAST compared with computed tomography (reference standard) in Trauma Team activation cases (N = 10). Data are presented as n.

| Examiner |                   | CT Findings      |                   | Total |
|----------|-------------------|------------------|-------------------|-------|
|          |                   | Absence of Fluid | Presence of Fluid |       |
| Nurse    | Absence of fluid  | 8                | 0                 | 8     |
|          | Presence of fluid | 0                | 2                 | 2     |
|          | Total             | 8                | 2                 | 10    |

However, these estimates are based on a very small number of positive cases and should be interpreted with caution.

## 4. Discussion

This study investigated the agreement between a nurse with relevant training and radiologists in performing FAST, as well as the diagnostic accuracy of the examination when performed by a nurse compared to CT, which was used as the reference standard.

However, these findings should be interpreted with caution, as the study was conducted in a single-center setting and included a single trained nurse, a limited sample size, a relatively short study duration, and a low number of positive cases. As such, the results should not be generalized beyond the study setting.

### 4.1. Agreement Between Examiners

The results of the study showed high agreement between the nurse and multiple radiologists in detecting free fluid in the RUQ region ( $\kappa = 0.85$ ,  $p < 0.001$ ). In the SUPH region, agreement was observed in all cases ( $\kappa = 1.00$ ,  $p < 0.001$ ). High observed agreement was also noted in the LUQ and BLADDER regions; however, kappa could not be reliably estimated due to lack of variability in the data.

These findings suggest a high level of agreement between the nurse and the radiologists when performing FAST; however, this should be interpreted with caution given the small number of positive cases and the study design. In addition, the findings are based

on a single trained nurse in a single-center setting and may therefore reflect individual operator performance rather than the broader feasibility of nurse-performed FAST as a clinical practice model.

There is limited data in the literature regarding nurse-performed FAST and its comparison with physician assessments. The results of this pilot study suggest that, following appropriate training, an emergency care nurse may be able to perform FAST and interpret the findings with a high level of agreement; however, these results should not be generalized beyond the specific study setting.

This is particularly relevant in the ED settings, where the availability of radiologists may be limited relative to patient volume, potentially leading to delays in ultrasound assessment of trauma patients [21]. In this context, training nurses in FAST may potentially support more timely patient assessment and improved ED functionality. This enhances both the safe, effective and quality care of patients [22] and the advanced role of nurses in the emergency care setting [23–25]. However, these aspects were not directly evaluated in the present study and warrant further investigation.

#### 4.2. Diagnostic Accuracy of Nurse-Performed FAST

The diagnostic accuracy of nurse-performed FAST was evaluated using CT as the reference standard. In the present study, sensitivity, specificity, and predictive values were estimated at 100%. However, these estimates should be interpreted with extreme caution, as they were derived from a very small number of patients and an extremely limited number of positive cases, resulting in wide confidence intervals and low precision. Therefore, these findings should be considered preliminary and not indicative of true diagnostic performance.

Compared with the limited available literature [17,18], the diagnostic estimates observed in the present study are higher and less stable. More specifically, in the study by Bowra et al. [17], nurses with experience in trauma management were trained in FAST through a one-day ultrasound seminar, which included three hours of theoretical training and three hours of practical training. They then participated in a certification process that involved performing and recording at least 25 FAST examinations. In this study, nurses performed FAST on 242 patients with suspected torso injuries in cases where a physician certified in performing FAST was not immediately available. The results were compared with CT findings or surgical findings obtained during hospitalization. Nurse-performed FAST demonstrated a sensitivity of 84.4%, specificity of 98.4%, a positive predictive value of 94.2% and a negative predictive value of 95.3% for the detection of free intra-abdominal fluid, with an overall diagnostic accuracy of 95.0%.

Henderson et al. [18] evaluated the ability of five nurse practitioners to perform ultrasound examinations after 16 h of training in POCUS (eight hours of theoretical training and eight hours of practical training), as well as one year of clinical experience under the guidance of emergency physicians in the ED. A total of 227 ultrasound examinations were recorded in this study, 25 of which were FAST examinations for trauma patients with suspected abdominal injury. Although no specific sensitivity, specificity or predictive value indices are reported for FAST examinations, the overall adequacy of the images obtained by the nurses was 86%, suggesting that the majority of ultrasound images were considered adequate for clinical evaluation. The quality and interpretation of the images were evaluated by an experienced emergency physician with expertise in ultrasound imaging. Overall, evidence from these studies suggests that nurse-performed FAST may be feasible following appropriate training; however, the magnitude and consistency of diagnostic performance vary across settings and study designs. The discrepancies observed

compared with prior literature are likely attributable to the small sample size and the low prevalence of positive cases, rather than reflecting true differences in performance.

In the present study, training consisted of 81 h of theoretical and practical instruction, including 20 h delivered online, as well as 6 months of supervised clinical practice. Previous research suggests that online training may support the development of basic ultrasound skills; for example, one study [26] reported that inexperienced medical students were able to acquire fundamental practical ultrasound skills following online instruction.

The importance of ultrasound training is consistently emphasized in studies involving nurses working in the ED [17,18,27]. However, training programs vary substantially in duration and structure, limiting comparability across studies.

The existing literature emphasizes the importance of both theoretical and practical training in developing POCUS skills [22,28]. In medical education, ultrasound training is often introduced as early as undergraduate programs [29] and continues throughout specialization [30]. In contrast, the integration of ultrasound into nursing education remains limited. Although some postgraduate nursing programs may include ultrasound training, evidence of its incorporation into nursing curricula is scarce. Despite not being a standard component of undergraduate or postgraduate nursing education, its importance is increasingly recognized in specific areas of clinical practice.

In practice, training in POCUS and FAST is often delivered through continuing professional development in clinical settings [31–36], although these programs are not standardized. Further research is needed to define optimal training pathways and competency benchmarks for nurses performing FAST in emergency care settings. Although the nurse in the present study underwent extensive training, the study design does not allow conclusions to be drawn regarding the impact of training intensity on diagnostic accuracy.

#### 4.3. Limitations

It is important to acknowledge certain limitations of the present study. First, this was a pilot study conducted at a single center, which limits the generalizability of the findings. Second, the sample size was relatively small.

Third, the relatively short study duration may have limited patient recruitment and the number of positive cases, potentially affecting the representativeness of the findings.

Fourth, a convenience sample was used, as patient inclusion depended on the availability of the participating nurse; therefore, not all eligible patients may have been included during the study period, introducing potential selection bias.

Fifth, the study did not systematically record the number or characteristics of eligible patients who were not included, and no comparison was performed between included and non-included cases; therefore, selection bias cannot be excluded.

Sixth, patient inclusion was also limited to specific time periods during which the trained nurse was available; therefore the included time windows may not fully represent routine ED operations across all shifts.

Seventh, the eligibility criteria, including the requirement for informed consent, the exclusion of life-threatening cases, and the exclusion of specific patient groups (e.g., patients with language barriers, BMI > 40, or pregnancy), may have led to the underrepresentation of more critically ill or complex patients, thereby introducing potential selection and spectrum bias.

Eighth, FAST examination was performed by a single nurse, which may limit the generalizability of the results. The findings may also reflect individual operator performance rather than the broader feasibility of nurse-performed FAST as a clinical practice model. In addition, FAST examinations were performed by multiple radiologists as part of routine

clinical practice, and their level of experience was not formally standardized, which may have introduced inter-operator variability.

Ninth, the training process was not based on predefined competency thresholds or standardized assessment criteria, and interobserver proficiency was not formally evaluated prior to study initiation. In addition, the quality of ultrasound images was not formally assessed by an independent expert, and therefore the technical adequacy of the examinations could not be evaluated.

Tenth, complete blinding between examiners was not feasible, as FAST examinations were performed sequentially and the second examiner was aware that a prior examination had been conducted. The time interval between assessments and the duration of FAST examinations were not systematically recorded or analyzed, and potential clinical changes were not systematically recorded. These factors may have introduced a degree of shared clinical context and may have influenced the observed inter-rater agreement.

Eleventh, CT imaging was not performed systematically in all patients but was based on clinical indications and routine trauma management protocols. As a result, different diagnostic pathways were followed (i.e., nurse-performed FAST with radiologist assessment and CT in some cases, and nurse-performed FAST with CT in Trauma Team activation cases). This approach may have introduced partial verification bias, as diagnostic accuracy estimates were derived from a selected subgroup of patients who underwent CT and may not fully represent the entire study population.

Twelfth, the number of patients included in the diagnostic accuracy analysis was limited, and the number of positive cases was particularly small. This may affect the estimation of sensitivity and specificity and lead to wide confidence intervals. In addition, the very low prevalence of positive findings may have influenced the observed inter-rater agreement, as high agreement may partly reflect concordance in negative classifications rather than consistent identification of positive cases, thereby limiting the stability and interpretability of agreement measures.

Finally, no formal a priori sample size calculation was performed for either the inter-rater agreement or the diagnostic accuracy analyses, as this study was designed as a pilot study. Therefore, the sample size may not be sufficient to provide precise or stable estimates, particularly for diagnostic performance.

Overall, these factors may limit the generalizability of the findings, and the results should therefore be interpreted with caution.

## 5. Conclusions

In conclusion, this pilot study suggests that a trained emergency care nurse may achieve a high level of agreement with physicians when performing and interpreting FAST examinations in trauma patients presenting to the emergency department.

With regard to the secondary objective, the findings provide preliminary insights into the diagnostic accuracy of nurse-performed FAST compared with CT. However, further investigation is required to more reliably assess diagnostic performance.

Overall, these results support the feasibility of nurse-performed FAST in emergency care settings. Further studies involving larger samples, multiple operators, multicenter designs, and standardized training protocols are needed to validate these findings, better define their role in clinical practice, evaluate their integration into routine care, and investigate their potential impact on patient safety.

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## Abbreviations

The following abbreviations are used in this manuscript:

|       |                                              |
|-------|----------------------------------------------|
| CT    | Computed Tomography                          |
| ED    | Emergency Department                         |
| FAST  | Focused Assessment with Sonography in Trauma |
| LUQ   | Left Upper Quadrant                          |
| POCUS | Point Of Care Ultrasound                     |
| RUQ   | Right Upper Quadrant                         |
| SUPH  | Subxiphoid-pericardial area                  |

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