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Original Research Article

Unscheduled return visits to a pediatric emergency department

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ABSTRACT

Background and objective: Return visits (RVs) to a pediatric emergency department (ED) within a short period after discharge have an influence on overcrowding of the ED and reveal some weaknesses of the health care system. The aim of this study was to determine the rate of RVs and factors related to RVs to the pediatric ED in Lithuania.

Materials and methods: A retrospective study in an urban, tertiary-level teaching hospital was carried out. Electronic medical records of all patients ($n = 44\,097$) visiting the ED of this hospital between 1 January and 31 December 2013 were analyzed. Demographic and clinical characteristics of patients who return to the ED within 72 h and those who had not visited the ED were compared. Factors associated with RVs were determined by multivariable logistic regression.

Results: Of the overall ED population, 33 889 patients were discharged home after the initial assessment. A total of 1015 patients returned to the ED within 72 h, giving a RV rate of 3.0%. Being a 0–7-year old, visiting the ED during weekdays, having a GP referral, receiving of laboratory tests and ultrasound on the initial visit were associated with greater likelihoods of returning to the ED. Patients who arrived to the ED from 8:01 a.m. to 4:00 p.m. and underwent radiological test were less likely to return to the ED within 72 h. Diseases such as gastrointestinal disorders or respiratory tract/ear–nose–throat (ENT) diseases and symptoms such as fever or pain were significantly associated with returning to the ED. The initial diagnosis corresponded to the diagnosis made on the second visit for only 44.1% of the patients, and the highest rate of the congruity in diagnosis was for injuries/poisoning, surgical pathologies (77.2%) and respiratory tract diseases (76.9%).

Conclusions: RVs accounted for only a small proportion of visits to the ED. RVs were more prevalent among younger patients and patients with a GP referral as well as performed more often after discharging from the ED in the evening and at night.

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1. Introduction

Return visits (RVs) to a pediatric emergency department (ED) within a short period after discharge, i.e., within 72 h are important for several reasons. First, RVs influence the overcrowding in the ED. Though return rates may be relatively low, they can lead to a considerably increased number of additional patients. For example, in the United States, RVs make up to 2.2%–3.5% of all ED visits [1] and are the cause of 25 000–75 000 additional patients annually [2]. RV rates have a tendency to increase each year, and Cho et al. reported that in the United States, the rate of RVs increased to 38% during the period of 2001 to 2007 [3]. It is worth noting that there is a difference in return rates between adults (0.2%–3.5%) [4–6] and children (1.1%–15.8%) [2,7–10], and this indicates that this issue is much more essential in the pediatric ED. RV to the ED is usually used as a quality indicator for EDs [11]. RVs leave less time for the physician to evaluate each patient and make specialists to pay much more attention to the returning patients, because there is a possibility of a previous error in the diagnosis of an illness or the progression of an illness. This could explain why returning patients are hospitalized more often or triaged to a more acute category, and why a complete blood count (CBC) is obtained from them more frequently than from patients during an initial visit [2,3,12]. On the other hand, there is an opinion that RVs themselves are caused by overcrowding in the ED. However, it has been proved that attempts to reduce overcrowding did not decrease RV rates [13,14].

Second, the existence of RVs reflects insufficient access to primary healthcare services in the case of acute diseases in children. Several studies have shown that it is more convenient for patients to come straight to the ED instead of visiting their general physician (GP) [15]. Data showed that only half of patients called their GP before returning to the ED and that one-third of them could not get an appointment [1].

Third, returning patients are at greater risk of adverse effects and mortality [13,16]. Some studies have shown, however, that up to 87%–97% of the return admissions are due to progression of the illness [1,17,18].

Several studies were done in North America, Western and Southern Europe, and Taiwan [2–4,7,13,15,18] in which the rates of RVs and variables that can influence RVs differ according to different studies and are dependent on the country, demographic situation, and health system. The aim of our study was to analyze the factors associated with RVs in an Eastern European country, predict the rates of RVs at a particular time, and optimize the function of the pediatric ED in Lithuania and other demographically similar regions.

2. Material and methods

A retrospective study was carried out in an urban, tertiary-care pediatric teaching hospital. This study was approved by Vilnius Regional Ethics Committee for Biomedical Research. In 2013, a total of 44 097 patients visited the ED, 33 889 of them for outpatient medical care. Electronic medical records of all patients who visited the ED between 1 January and 31 December 2013 were analyzed. The patients who were

hospitalized during their initial visit to the ED were excluded from further analysis. A visit to the ED was categorized as urgent if the condition of the attending patient was acute, critical, or potentially life-threatening. An RV was defined as any visit made by a patient younger than 18 years that occurred within 72 h after the previous visit to the ED. Demographic and clinical characteristics of the patients who returned to the ED within 72 h (72-h RVs) were compared with those of the patients who had not visited the ED within the previous 72 h (non-RVs). Additional comparison was made between the first and second visits of RV patients. Demographic variables included patient's age (0–2, 3–7, 8–12, and 13–17 years) and sex. Clinical variables included those related to both presentation and treatment. Presentation-related variables included the season, day of the week (weekday and weekend including bank holidays), time of the day (0.01–8.00 a.m., 8.01 a.m.–4.00 p.m., 4.01 p.m.–midnight), mode (arrival to the ED with or without a GP referral), and urgency (urgent or non-urgent). Variables related to treatment decisions included use of any radiologic or ultrasound imaging, laboratory tests (blood and/or urine), and nature of services provided (short stay, consultation provided by one specialist or more). Single-specialist consultation was defined as a consultation given by an ED physician. Multispecialist consultation was defined as a consultation by an ED physician and one or more specialist physicians. Short stay service was defined as observation in the ED that lasted 4–24 h.

To further understand the clinical characteristics of RV patients, we classified them based on the diagnoses they received. Diagnoses at discharge were grouped into 7 categories: respiratory tract and ENT pathologies; gastrointestinal tract pathologies; neurological pathologies; signs and symptoms (fever, abdominal pain, headache); injuries, poisoning and surgical pathologies; lesions of the skin and mucus membranes; and other issues (all other diagnoses).

All statistical analyses were performed by using SPSS statistical software (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.). We compared RVs with non-RVs with respect to demographic and clinical variables using the χ^2 test. Variables nominally associated ($P < 0.2$ in bivariate analysis) were entered in a multivariable logistic regression model with a visit type (RV vs. non-RV) as a dependent variable. All statistical tests were 2-tailed, and $P < 0.05$ was considered statistically significant.

3. Results

A total of 44 097 patients visited the ED in 2013. Less than a quarter (23%, $n = 10 208$) was hospitalized during the initial visit and were not included in our study. The remaining part (76.9%, $n = 33 889$) of the patients were discharged, and their medical records were analyzed further. Of the cohort analyzed, 1015 patients (3.0%) returned to the ED within 72 h and were considered to be RV patients. Nearly a quarter (24%, $n = 248$) of the returning patients were hospitalized, and the rest were discharged home for the second time. Patients who returned to the ED for the second time within 72 h accounted for 3.1%

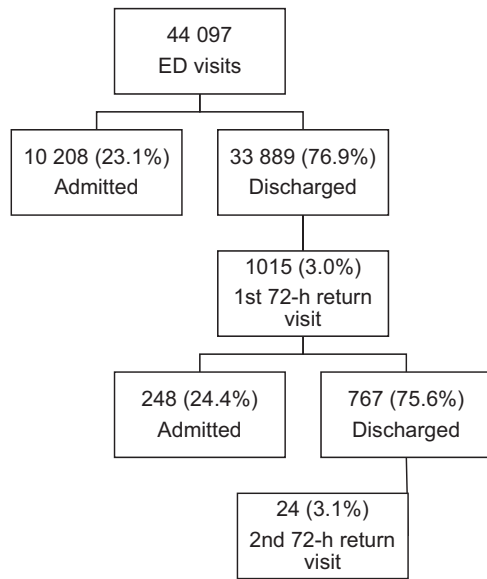


Fig. 1 – Patients' flow in the ED, included in the study.

($n = 24$), and of them, more than half ($n = 13$, 54.2%) were hospitalized (Fig. 1).

3.1. Age and sex

In the 72-h RV group, infants and children under 3 years of age and those aged 3–7 years accounted for the greatest proportions (43.3% and 31.9%, respectively). The likelihood of returning to ED within 72 h was 2 times and nearly 1.5 times greater among children aged less than 3 years (odds ratio [OR] = 2.043, 95% confidence interval [CI] = 1.668–2.502) and those aged 3–7 years (OR = 1.436, 95% CI = 1.164–1.772), respectively, than among the oldest children. There was no difference in return rates according to the sex of the child (Tables 1 and 2).

3.2. Urgency

Less than two-thirds of the patients who returned to the ED with 72 h arrived without a GP referral, and almost 90% were considered as urgent care patients. Having a GP referral was associated with almost 1.5 times increased risk of returning to the ED within 72 h (OR = 1.485, 95% CI = 1.305–1.69). Similar proportions of RV and non-RV patients were found to be in need of urgent care, but there were more returning patients

Table 1 – Characteristics of 72-h return visits (initial visit) vs. non-return visits.

Characteristics	72-h RVs % (n) n = 1015	Non-RVs % (n) n = 32 874	Total % (n) n = 33 889	
Age, years				$\chi^2 = 81.24$; $df = 3$; $P = 0.000$; $P < 0.05$
0–2	43.3 (439)	30.8 (10 134)	31.2 (10 573)	
3–7	31.9 (324)	32.7 (10 758)	32.7 (11 082)	
8–12	12.6 (128)	18.4 (6040)	18.2 (6168)	
13–17	12.2 (124)	18.1 (5942)	17.9 (6066)	
Sex				$\chi^2 = 0.762$; $df = 1$; $P = 0.383$; $P > 0.05$
Female	46.0 (467)	44.6 (14 647)	44.6 (15 114)	
Male	54.0 (548)	55.4 (18 227)	55.3 (18 775)	
Season				$\chi^2 = 3.754$; $df = 3$; $P = 0.289$; $P > 0.05$
Spring	30.1 (306)	28.2 (9283)	28.3 (9589)	
Summer	24.2 (246)	23.6 (7749)	23.6 (7995)	
Autumn	23.9 (243)	24.2 (7942)	24.2 (8185)	
Winter	21.7 (220)	24.0 (7900)	24.0 (8120)	
Time of arrival				$\chi^2 = 26.922$; $df = 2$; $P = 0.000$; $P < 0.05$
0:01 a.m.–8:00 a.m.	8.3 (84)	6.8 (2226)	6.8 (2310)	
8:01 a.m.–4:00 p.m.	32.6 (331)	40.6 (13 360)	40.4 (13 691)	
4:01 p.m.–midnight	59.1 (600)	52.6 (17 288)	52.8 (17 888)	
Day of the week				$\chi^2 = 6.613$; $df = 1$; $P = 0.006$; $P < 0.05$
Weekday	64.9 (659)	60.9 (20 030)	61.0 (20 689)	
Weekend	35.1 (356)	39.1 (12 844)	39.0 (13 200)	
GP referral				$\chi^2 = 45.616$; $df = 1$; $P = 0.000$; $P < 0.05$
Yes	38.8 (394)	29.0 (9540)	29.3 (9934)	
No	61.2 (621)	71.0 (23 334)	70.7 (23 955)	
Urgency				$\chi^2 = 0.043$; $df = 1$; $P = 0.835$; $P > 0.05$
Urgent	88.3 (896)	88.1 (28 949)	88.1 (29 845)	
Non-urgent	11.7 (119)	11.2 (3925)	11.9 (4044)	
Service type				$\chi^2 = 42.978$; $df = 2$; $P = 0.000$; $P < 0.05$
Short stay in the ED	2.8 (28)	1.6 (518)	1.6 (546)	
Multispecialists' consultation	11.9 (121)	7.2 (2353)	7.3 (2474)	
Single-specialist consultation	85.3 (866)	91.3 (30 003)	91.1 (33 889)	

Table 2 – Factors associated with 72-h return visits (multivariate model).

Characteristic	Adjusted odds ratio (95% CI)	P
<i>Age, years</i>		
0-2	2.043 (1.668-2.502)	<0.001
3-7	1.436 (1.164-1.772)	0.001
8-12	1.017 (0.791-1.306)	0.897
13-17	Reference	
<i>Time of arrival</i>		
0:01 a.m.-8:00 a.m.	Reference	
8:01 a.m.-4:00 p.m.	0.708 (0.554-0.905)	0.006
4:01 p.m.-midnight	1.008 (0.797-1.275)	0.945
<i>Day of the week</i>		
Weekday	1.235 (1.083-1.409)	0.002
Weekend	Reference	
<i>Clinical</i>		
GP referral	1.485 (1.305-1.69)	<0.001
Laboratory tests	1.821 (1.598-2.074)	<0.001
Radiological test (any)	0.425 (0.356-0.508)	<0.001
Ultrasound	2.308 (1.819-2.928)	<0.001
<i>Service type</i>		
Short stay in the ED	1.838 (1.248-2.706)	0.002
Multispecialists' consultation	1.738 (1.429-2.115)	<0.001
Single-specialist consultation	Reference	

CI, confidence interval.

with the acute condition on their initial visit than on the second one (Tables 1 and 2).

3.3. Time of the day and season of the year

Visits to the ED occurred most frequently between 4:00 p.m. and midnight and accounted for more than half of all visits. Patients who visited the ED from 8:01 a.m. to 4:00 p.m. were less likely to return to the ED than patients who visited the ED at night, i.e., 0:01 a.m. to 8:00 a.m. (OR = 0.708, 95% CI = 0.554-0.905). Visiting the ED during weekdays was associated with a 1.2-fold greater likelihood of returning to the ED than visiting the ED on weekdays (OR = 1.235, 95% CI = 1.083-1.409).

In spring, there was a trend in the higher rate of visits to the ED (28.3%), and the same trend was observed in both groups. However, no significant seasonal differences in RV rates were observed (Table 1).

3.4. Intervention and services

One-third of the patients received laboratory and radiological tests, and only 4% of the patients underwent ultrasound during the initial visit.

During the initial visit, laboratory tests were performed significantly more often in the RV group than in the non-RV group (47.2% vs. 30.6%). Contrary, the patients who did not return to the ED within 72 h underwent radiological tests more frequently (32.8% vs. 15.6%). The rates at which ultrasound scans were performed were rather low in both groups, but RV patients received them twice as often as non-RV patients (7.9% vs. 3.8%). RV patients received multispecialist consultations and stayed in the ED shortly more often than non-RV patients (11.9% vs. 7.2% and 2.8% vs. 1.6%) (Table 1).

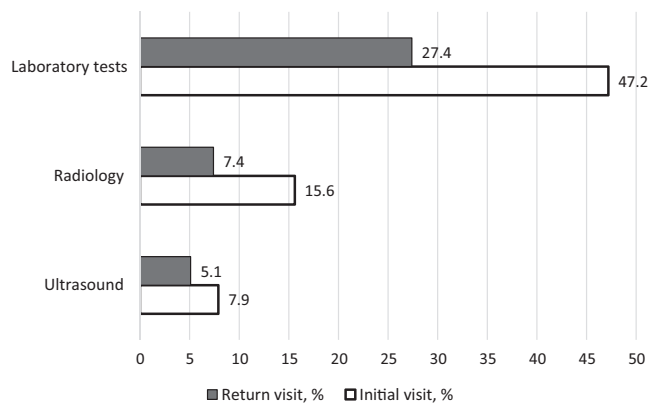


Fig. 2 – Interventions performed during the initial and return visit to the ED (P < 0.001).

In multivariate analyses, the likelihood of returning to the ED within 72 h was 1.6 and 2.3 times greater for the patients who underwent laboratory tests and ultrasound (OR = 1.821, 95% CI = 1.598-2.074 and OR = 2.308, 95% CI = 1.819-2.928, respectively) and 2.4 times lower for the patients who received radiological tests (OR = 0.425, 95% CI = 0.356-0.508) (Table 2).

3.5. Underlying diseases

The most common underlying diseases diagnosed on the initial visit were injuries, poisoning, and surgical pathologies (40.3%), but during the RV, they accounted for only 16.5%. Gastrointestinal disorders, symptoms, and respiratory tract/ENT diseases were significantly associated with returning to the ED (OR = 1.752, 95% CI = 1.433-2.156).

Only for 44.1% of the patients, the initial diagnosis corresponded to the diagnosis made on the second visit, and the highest rate of the highest rate of congruity in diagnosis was for injuries/poisoning and surgical pathologies (77.2%) and respiratory tract/ENT diseases (76.9%).

3.6. Comparison of RVs on their initial and second visits

The condition of returning patients tended to be more acute on their initial visit than on the second one. This was partly based on the observation that RV patients more frequently had a GP referral on their second visit to the ED than on their initial visit. Moreover, laboratory (47.2% vs. 27.4%) and radiological tests (15.6% vs. 7.4%) were also more commonly done during the initial visit (P < 0.001) (Fig. 2).

Patients who returned to the ED had a higher prevalence of neurologic and gastrointestinal disorders, syndromes, and skin/mucous lesions during their second visit, while respiratory tract/ENT diseases were more common on their initial visit.

4. Discussion

In this study, we have described the 1-year experience of RVs to a tertiary-care pediatric emergency department in Vilnius. To our knowledge, this is the first study analyzing RV rates

within 72 h as well as possible reasons and factors for RVs in the region of Eastern Europe. In our study, the RV rate to the ED within 72 h (3.0%) was a slightly higher than an RV rate of 2.7% documented during a 7-year study in several hospitals in the United States [3]. RV rates in other countries vary between 1.1% and 15.8% according to the time after discharge from the ED for the first time [2,7-9,18]. The RV rate of 3.0% in our country could be explained by good accessibility of medical care in hospitals. It is possible that patients sometimes find it much more convenient to consult a doctor in the ED than in a primary health care institution [15], especially during the weekend, and our study showed that more visits to the ED occurred on Saturdays and Sundays. On the other hand, the tendency to return more often on Mondays and Tuesdays suggests that it is more difficult to get to one's primary health care physician after the weekend, especially when the visit is not the first one. One more detail is important in validating this hypothesis: RV patients had a referral from their primary health care physician more often than non-RV patients. Moreover, the symptoms of returning patients were not as acute on their second visit as they were on their first visit. This finding is not in agreement with the results of other studies stating that the symptoms of RV patients were more acute than the symptoms of other ED visitors [2]. Moreover, we did not find that the higher the urgency of the first visit, the higher the likelihood that the patient would return to the ED within 72 h, which is contrary to the observation of the study by Goldman et al. [7].

Since spring is the most critical period for various, especially viral, children's diseases, it is not surprising that the ED in our study was most crowded in spring. However, other study reported winter to be the most crowded season, which was also explained by an increase in the prevalence of infectious diseases [2].

We found that time of the day could be a factor in predicting RVs. Patients who visited the ED in the evening until the midnight were more prone to return. This finding corresponds to the results of other studies [7,15]. It could be explained by limited time for parental instruction at discharge due to busy hours in the evening when primary health care institutions are closed.

As might be suspected, infants and young children were the most common ED patients, particularly in the RV group. Many other studies have reported similar data [2,7,15,17], except one study that reported infants (up to 1 year of age) and children aged 13 to 18 years to be the vulnerable population [3]. It is not surprising that infants are a risk group due to their immature systems and potential rapid progression of pathologies. In addition, infants are not able to express their discomfort in specific terms or show where they feel pain [2,7]. For these reasons, physicians are extremely attentive when evaluating infants and tell parents to return to the ED immediately if they notice any sign of concern. On the other hand, parents sometimes cannot evaluate the condition of their child properly and return to the ED after the smallest change in the behavior of their child occurs. A study by Easter and Bachur showed a decrease in infants' revisits to the ED caused by higher rates of admission during the initial visits [18].

Comparison of the first and second visits showed that the pathologies diagnosed and the tests performed differed. Since

trauma was the main reason for visiting the ED for the first time, we presume that this is the explanation for the clear-cut distinction in the performance of radiological tests in the RV and non-RV groups. In addition, patients who returned had a higher prevalence of gastrointestinal pathologies and symptoms (for example, abdominal pain). This explains why RV patients were given ultrasound scans more frequently. Since laboratory tests, ultrasound scans, hospitalization, and observation (short stay in the ED) were more likely to be provided to RV patients, we could suppose that at the beginning the condition of these patients was more serious than the condition of non-RV patients.

It is quite difficult to determine the reasons why patients return to the ED. In our study, laboratory and radiological tests as well as observation were more common during the first visit and could suggest that the reason for returning to the ED was not as serious as it was on the first visit. On the other hand, higher rates of hospitalization on the second visit suggest the progression of the disease. Because of this discrepancy, our results are not in line with the findings of Alessandrini et al. who reported that patients returning to the ED appeared to be sicker than the overall ED population [2]. The disagreement of 44.1% in the diagnoses also emphasizes that many incorrect diagnoses were made on the first visit, which could be due to several reasons such as physician's error, manifestation of new symptoms that could not be evaluated initially, or a totally different disease.

To minimize the rate of ED visits it would be reasonable to optimize the primary healthcare system and ensure that all children would get appropriate urgent care at their GP office. This needs additional funding from the government to ensure specialists and necessary tests to be available not only on workdays but on weekends as well. Moreover, parental teaching is also needed to inform them about "red flags" when they really should seek medical care [19]. In addition, it is important to improve health care management in the ED especially during the most overcrowded periods.

Some limitations to this study can be acknowledged. Analysis of the reasons for RVs was done retrospectively according to the interpretation of medical records but not directly from parents' reports, hence the conclusions about the causes of returning to the ED are subjective. Moreover, triage categories were not available on an electronic database, and acuity of visits was determined indirectly according to the tests done during the visits and the fact if patients had a referral from their GP. We did not evaluate the proportion of patients who left the ED without being seen because these data were not available. In this study, we also did not evaluate whether patients visited another hospital after discharge.

5. Conclusions

RVs accounted for only a small proportion of visits to the ED. RVs were more prevalent among younger patients and patients with a GP referral as well as performed more often after discharging from the ED in the evening and at night. Gastrointestinal tract and respiratory tracts diseases were the most prevalent among RV patients and they could be treated in a primary health care institution. This study could contribute

to a better development of quality initiatives to prevent RVs and better coordination with primary health care.

Conflict of interest

The authors declare that they have no conflict of interest.

Authors' contributions

S.B. conceptualized and designed the study, contributed to the collection and interpretation of data, and approved the final manuscript. I.K. drafted the initial and final manuscript and contributed to the collecting of literature. M.S. participated in the design of the study and performed the statistical analysis. L.L. participated in final manuscript revision and preparing for submission.

J.R. reviewed and revised the manuscript, conceptualized and designed the study, and approved the final manuscript as submitted. R.C. conceptualized and designed the study, reviewed and revised the manuscript, and approved the final manuscript as submitted. E.B. repeated the statistical analysis of the final manuscript as resubmitted. V.U. conceptualized and designed the study, supervised data collection, critically reviewed the manuscript, and approved the final manuscript as submitted.

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