Empowering Medical Students to Practice High-Value Care

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Abstract: Over the last decade, initiatives like the Choosing Wisely campaign have promoted the practice of evidence-based, cost-conscious care. However, education surrounding value in medicine has been largely restricted to graduate-level medical education or post-clerkship undergraduate medical education. Here, we present a mixed-methods study evaluating pre-clerkship medical student engagement with and response to new value-based curricular initiatives to assess whether high-value care (HVC) can be introduced successfully earlier in training. Initiatives were introduced into the pre-clerkship clinical curriculum without major alterations to the established curricular structure. These comprised an annual event devoted to self-reflecting on HVC observed in prior and current clinical experiences and subsequent small-group facilitated discussion. Engagement with and response to these initiatives were analyzed for two whole-class cohorts using an abductive, progressive focusing approach complementing quantitative survey data. Baseline familiarity with HVC and post-event response to the annual event was higher and more positive, respectively, among responders from the Class of 2025 compared with those from the Class of 2024. Analysis of reflection essays revealed the emergence of five primary themes differentiating the two class years: (1) understanding HVC, (2) addressing barriers to HVC, (3) medical waste and underserved communities, (4) patient–physician relationship and value, and (5) self-reflection. Evaluation of thematic patterns in light of survey response data suggests that early clinical exposure combined with intentional self-reflection could promote engagement with HVC topics in a way that shapes students’ foundational understanding of the practice of medicine.

Keywords: curriculum; pre-clerkship; high-value care; mixed methods; undergraduate medical education; self-reflection; abductive reasoning; progressive focusing; engagement; themes

1. Introduction

Healthcare in the United States may best be characterized by its poor value; the amount Americans spend on their health has failed to yield positive mortality outcomes. According to the Peterson-Kff Health Systems tracker, mean life expectancy in the United States in 2021 was 76.4 years, almost 6 years below the Comparable Country Average of 82.3 years. Moreover, U.S. per capita healthcare spending is nearly twice the average of other developed countries [1]. This disturbing trend has only worsened since the COVID-19 pandemic, highlighting the urgency for systemic dedication toward addressing this issue. Value in health care has been defined as “the measured improvement in a patient’s health outcomes for the cost of achieving that improvement” [2]. It has been estimated that 30% of health care spending in the U.S. pays for low-value care (LVC), defined as “health services that provide little or no benefit, has potential to cause harm, incurs unnecessary costs, and wastes limited resources” [3,4]. While there are systemic factors contributing to poor value in the U.S. health system that need to be addressed, physicians play a pivotal role in driving movement toward a system of value-based health care. As such, physicians-in-training will need to understand their role within the larger care team as well as the importance of measuring the health outcomes that matter most to patients [5]. Toward this
end, the Choosing Wisely campaign (an initiative started by the American Board of Internal Medicine (ABIM) Foundation in 2012) has advocated for the practice of evidence-based, guideline-directed care to directly address practices contributing to LVC [6].

While there has been increased awareness of the consequences of LVC over the last two decades, there has been no consensus on exactly how and when to introduce this topic in the training of physicians. The Accreditation Council for Graduate Medical Education (ACGME) requires residency programs to provide training related to value-based care. However, surveys conducted across larger specialties like internal medicine and general surgery have revealed that less than one-third of residents report exposure to cost considerations related to the tests they routinely order [7,8]. Integration of value-based care into medical school curricula remains in its infancy, and there is a growing recognition of its relevance to clinical practice. A survey performed by Cayea et al. found that internal medicine clerkship directors reported that HVC is insufficiently taught and assessed in medical school [9]. Notably, several promising efforts have been made recently to establish and evaluate novel HVC curricula at the pre-clerkship level, which typically represents the first two years of medical school. These reports suggest that medical students in their pre-clerkship years are capable and motivated to learn and practice HVC [10–12].

An important consideration for evaluating how learners engage with a new topic is how attitudes contribute to behavior in practice [13,14]. Mordang et al. found that resident physician attitudes toward HVC were negatively impacted by a lack of faculty modeling of patient care-related behaviors promoting value [15]. This underscores the challenge faced in promoting the adoption of HVC practices: despite increased exposure among newer trainees to HVC, trainee behavior remains influenced by their own attitudes arising from perceptions of more experienced faculty who may not explicitly demonstrate value-based principles in their patient interactions. In 2015, Ryskina et al. found that varying HVC knowledge and practice among internal medicine residents correlated closely with whether or not faculty engaged in discussions of HVC during patient care [16]. Given the complexity of medical practice, self-reflection can help learners gain insight into the influence of their own biases and attitudes toward value-based clinical decision-making [17]. Indeed, a systematic review by Stammen et al. on training physicians to provide cost-conscious care argued for the inclusion of reflective practice, combined with specific knowledge transmission and a supportive environment, in the development of educational interventions related to value-based care [18].

Reducing waste in the U.S. health system represents a daunting challenge, but it begins with training all physicians to make decisions in a cost-conscious, outcome-driven manner. Emphasizing value as a core tenet of medical education does not necessitate major overhauls to curricula already in place in medical schools across the U.S. Rather, prioritizing value early in medical training reflects an opportunity to contextualize learning within an environment of real-world, evidence-based applicability. This has the potential to drive down medical waste while also producing future generations of physicians across all specialties who are committed to practicing in a cost-conscious, outcome-driven way. Thus, the objectives of this mixed-methods study were to (1) explore pre-clerkship medical students’ understanding of and attitudes toward value-based care and (2) evaluate the influence of novel value-based curricular initiatives in promoting the identification and practice of HVC at the pre-clerkship level.

2. Materials and Methods

2.1. Theory Orientation

We selected constructivism as a relevant theory to guide our study design and data analysis. Constructivism is a learning theory that posits that individuals construct knowledge through their experiences and interactions with the world [19]. In educational research, this theory is often used to understand how learners make sense of educational content and experiences. By using a constructivist framework, we hoped to gain deeper insights into how pre-clerkship medical students engage with and internalize value-based curricular ini-
tiatives, providing valuable information for designing effective educational interventions. Constructivism aligns well with our goal of evaluating pre-clerkship medical students’ engagement with and response to value-based curricular initiatives, as it focuses on students’ personal experiences and reflections to explore their understanding of high-value care (HVC). By emphasizing the importance of reflection in learning, constructivism suggests that through reflective practices, students can integrate new knowledge with their existing understanding, leading to deeper learning. Thematic analysis of emerging themes can be conducted through a constructivist lens to understand how students construct their knowledge and attitudes.

2.2. Curriculum Intervention and Research Approach

We implemented curricular interventions aimed at increasing exposure to value-based medicine topics during pre-clerkship (first, “Y1” and second, “Y2”) years for two class cohorts at the Frank H. Netter M.D. School of Medicine at Quinnipiac University (FHN-SOM). We first distributed “High-Value Care Cards” at Y1 and Y2 orientation, intended for students to have on hand while at their longitudinal clinical sites during pre-clerkship years (Figure 1). Additionally, we added applicable Choosing Wisely “Pearls” (evidence-based, society-specific guidelines aimed at promoting HVC) to the end of weekly assigned readings within the Clinical Arts and Sciences (CAS) course. Pearls were chosen so that they aligned with the organ system-specific block students were experiencing in a given week. We also created a dedicated high-value care event during Y2, for which students wrote reflections on their experiences and observations with value-based medicine topics in their current and any previous clinical settings (Figure 2). Prompts for essays were open-ended and invited students to comment on their observations, attitudes, or present understanding of value-based care; they were designed to encourage students to think broadly and deeply about their clinical experiences, which fostered the elicitation of rich, nuanced data that in turn facilitated the emergence of diverse, prominent themes (Appendix A.2). During the event, students met in their weekly small groups and individually shared their perspectives on value in medicine and commented on each other’s reflections. These discussions were facilitated by two faculty members who were provided with prompts to encourage meaningful discussion.

Following data collection, an abductive, progressive focusing approach was applied to this investigation as progressive focusing permits the emergence of qualitative findings from the analysis of empirical phenomena and their interaction with theory [20]. This approach is complemented by abductive reasoning by making pragmatic inferences from data, taking unexpected observations into account; this allows theory to be matched with reality in order to explain our observations [21,22]. No formal recruitment was required for this study as participants experienced the HVC curriculum as part of their required pre-clerkship coursework. Baseline surveys were obtained for both class cohorts at the start of Y2, and an additional survey was obtained following the dedicated HVC event. Curriculum implementation, survey distribution, and data analysis occurred from August 2021 to January 2024.

2.3. Study Context

The pre-clerkship component of the FHN-SOM curriculum comprises four courses: Foundations of Medicine (FOM), Clinical Arts and Sciences (CAS), Scholarly Reflection and Concentration Capstone (SRCC), and Coaching for Adaptive Learning (CFAL). These courses integrate basic, clinical, and educational science content across the curriculum, utilizing a block structure organized around organ systems. Various pedagogical approaches emphasize active learning, retention, and retrieval strategies. In FOM, the primary educational objective is for pre-clerkship students to acquire foundational knowledge in basic sciences, with a particular emphasis on a comprehensive understanding of prevalent and representative medical conditions. CAS involves immersive small-group experiential learning, featuring interactions with standardized patients, video review sessions, goal-setting...
exercises, and constructive feedback from clinician preceptors. Students are paired with community physicians, spending one day per week at an internal medicine, pediatric, family medicine, or a subspecialty-specific site under the guidance of their physician (medical student home; MeSH). Under supervision, students develop essential clinical skills, including patient interviewing and examination, clinical reasoning, participation in the diagnostic process, and contributing to treatment plans. SRCC is dedicated to cultivating students’ proficiency in evaluating information sources, critically appraising the literature, interpreting and engaging with data, fostering reflection, nurturing mentor–mentee relationships, instilling responsible research practices, and advancing scholarship related to capstone projects. CFAL is a short 7-week course in which medical students develop foundational knowledge and skills in self-regulation and adaptive learning.

**Figure 1. HVC cards. Front (top) and back (bottom).**
2.4. Participants

Potential participants included 90 students from the Class of 2024 and 94 students from the Class of 2025. “Class of 2024” and “Class of 2025” refer to the year these students are anticipated to graduate from the four-year MD degree program. Requests to complete a baseline survey assessing HVC familiarity were sent out during orientation week at the start of Y2 for both cohorts. Students from both class years were also asked to complete post-event surveys following the dedicated Y2 HVC event in CAS. Participation in both surveys was voluntary, with no academic consequences for failing to complete the surveys. Potential responders were contacted by coinvestigator C.E. via email with a statement of purpose and anonymity for the survey. This study was approved by the Quinnipiac University institutional review board (#10621).

2.5. Data Collection

Two different sets of 5-point Likert scale-based surveys were administered during Y2 for both student cohorts. The first 5-question survey assessed general familiarity with value-based medicine and was completed at the start of Y2 (Figure 3). The questions in baseline survey questions were designed to gauge students’ self-reported knowledge and exposure to value-based care principles at the outset of the intervention. Students also completed a post-event survey following the HVC session in Y2. The purpose of the post-event survey was to evaluate whether students felt more likely to identify and practice HVC in the future as a result of this dedicated session, in addition to the evaluation of a required curricular session. In addition to these two surveys, reflection essays submitted as mandatory prework for the dedicated HVC session were compiled for thematic analysis. Reflective essays were complemented by small-group discussions facilitated by experienced faculty members. Given the potential limitations of relying solely on reflective essays, these discussions provided a platform for students to share their experiences, learn from peers, and engage in deeper critical thinking about value-based care. Thus, this combination of reflective writing and facilitated discussion aimed to create a comprehensive learning experience.
2.6. Reflexivity

The investigative team was composed of C.E., currently a fourth-year medical student, D.M., professor of medical sciences and assistant dean for foundational science curriculum with experience in qualitative research methodology, and A.W., associate professor and assistant dean for clinical curriculum, who helped implement the new HVC event. According to best practice standards, investigators’ roles, perspectives, and the circumstances or processes by which studies are conducted influence qualitative data collection and analysis [23]. To ensure the integrity of our study, we sought to maintain awareness of our actions within the research context as well as our responses to the study outcomes [24]. C.E., as a student member of the Choosing Wisely S.T.A.R.S. program and peer or near-peer to participants, sought to remain cognizant of his outsider perspective. D.M. did not interact with participants as he is not a faculty member in the CAS course or HVC experiences. A.W. sent out reminders to Y2 students to complete the required HVC event pre-work and informed them of the voluntary post-survey through the curricular material. A.W. assisted C.E. in the creation of reflection prompts and the pre- and post-survey questions. B.R. is a graphic design specialist who assisted with post hoc data analysis and is not affiliated with FHNSOM.

2.7. Data Analysis

Survey data were provided via an anonymous online platform (Google Forms) and analyzed independently by C.E. using Microsoft Excel (version 16.85). Student reflection essays were de-identified by a third party and independently reviewed and coded by C.E. Essays were numbered from S01 to S180, where S01–S90 reflect the 90 respondents from the Class of 2024, and S91–S180 represent the 90 respondents from the Class of 2025 who submitted reflection essays. Student reflection essays were explored using an abductive, progressive focusing approach, which combines inductive and deductive approaches [24,25]. Initial codes suitable for deductive coding were created based on the principles of high-value care and the specific content of the curricular intervention. We analyzed the content of the essays to deduce patterns arising from the presence and absence of these initial codes. These deductive codes provided a structured framework aligning with expectations prior to reading the essays. Subsequently, additional codes were generated to encapsulate unanticipated observations, processes, and perspectives from each participant. This inductive coding process involved constant comparison, allowing for the emergence of new codes directly from the data [26]. After coding, we implemented a progressive focusing approach, systematically refining and concentrating codes derived
from both deductive and inductive methods. This approach allowed the main aspects of our HVC intervention to be integral to the process while permitting data-derived themes to surface. Lastly, we viewed medical students as capable of conveying various dimensions of their interactions with and interpretations of educational experiences directly observable in their learning environment.

3. Results

We investigated how preclinical students engage with value-based medicine topics, drawing insights from their personal experiences and reflections. Our goal was to capture not only surface-level familiarity expressed in surveys but also the nuanced dimensions of their interaction with high-value care (HVC) in reflective writing. By exploring personal experiences, we aimed to elucidate the multifaceted ways in which students navigate and interpret value-based medicine topics.

3.1. Baseline Perceived Familiarity with Value-Based Medicine

Respondents from the Class of 2025 rated their baseline knowledge of value-based healthcare and the Choosing Wisely campaign higher than respondents from the Class of 2024 (Figure 3). Similarly, students in the Class of 2025 discussed value-based medicine with their MeSH preceptors more frequently and were more likely to have looked up a Choosing Wisely recommendation compared to Class of 2024 respondents during Y2. There was a mixed response to the statement, “There is an appropriate amount of curricular time dedicated to value-based medicine at Netter.” Of note, the Class of 2025 respondents were more likely to have non-neutral opinions on this statement.

Q1: At this point, how would you rate your current knowledge of the Choosing Wisely campaign?
Q2: At this point, how would you rate your current knowledge of value-based healthcare?
Q3: To what extent do you agree with the following statement? “There is an appropriate amount of curricular time dedicated to value-based medicine at Netter.”
Q4: Did you ever discuss Choosing Wisely or value-based medicine with your MeSH preceptor during first year?
Q5: Have you ever looked up a Choosing Wisely recommendation?

3.2. Response to Dedicated HVC Event

Post-event surveys solicited from the Classes of 2024 and 2025 are depicted in Figure 4. Students from the Class of 2025 responded more positively to each of the six close-ended survey questions, both with respect to how the session was organized and executed as well as whether they felt they could identify or practice HVC as a medical student following the session. In addition to these quantitative metrics, a similar pattern is reflected in responses to the optional, open-form responses at the end of the survey, where students were invited to share “what went well” and “what could have been improved upon” for future sessions. For strengths of the event, one Class of 2025 respondent wrote, “I enjoyed hearing about other students’ experiences; since I haven’t had this discussion with many other students. I also liked that we were able to have a relaxed discussion about high-value care, as this was very different from our usual CAS sessions”. Another student shared that “it was helpful to hear about [how] different clinical settings and approaches factored into high- and low-value care”. Respondents from the Class of 2024 were receptive to the event and reviewed it favorably as well. Notably, multiple respondents mentioned how they appreciated having the added perspective of physician faculty facilitators for the session: “The faculty did their best to facilitate relevant conversations, and students participated”; “[a strength of the session was] getting the perspective of the preceptors we have, including the mistakes that they’ve made and the things that they’ve done that were effective for their practice”.


With regard to areas of improvement for the event, three Class of 2024 respondents mentioned a desire for additional focused lectures on the topic of HVC prior to the event itself or shared that their preceptors during the pilot event “were not properly equipped” to facilitate fruitful discussions surrounding high-value care.

Q1: This event contributed to my ability to identify clinical practices and/or factors contributing to high- or low-value care;
Q2: This event contributed to my ability to practice high-value care as a medical student;
Q3: The learning objectives for this event were met;
Q4: The content of this event contributed to my learning;
Q5: The learning format of this event was engaging;
Q6: The content of the event was appropriate for the allotted time.

3.3. Emerging Themes in Student Reflection Essays

After coding and progressive focusing of 90 reflection essays for the Class of 2024 and 90 essays for the Class of 2025, five major themes emerged highlighting patterns across the two class cohorts: (1) addressing the question “What is High-Value Care?”, (2) discussing barriers to HVC, (3) discussing value in the context of medically underserved communities, (4) analyzing the contribution of the patient–physician relationship toward value-based decision-making, and (5) engaging in self-reflection on what was learned or what may be applied to one’s own future practice. Illustrative quotes identified by anonymous participant codes (e.g., S01, S92, etc.) are provided in italics below.

3.3.1. Understanding HVC

Thematically, students generally defined HVC by presenting the topic in one of three ways in responding to the prompts provided (Appendix A.2). First, responders attempted to provide their own definition or cited an external definition (Figure 5a). Alternatively, some students emphasized the evidence-based and guideline-directed nature of HVC
in their reflections (Figure 5b). Lastly, a third group of students specifically discussed preventive health in their reflections to demonstrate examples of HVC (Figure 5c).

**What is High-Value Care?**

![Graph showing percentages of definitions, guidelines discussed, and preventive health discussed.]

**Figure 5.** Outlining approaches taken to characterize high-value care: citing external sources for definitions or providing own definitions via examples (a), emphasizing evidence-based decision-making and guideline-directed care in medical decision-making (b), and using preventive health to illustrate value-based medicine (c).

Most often, students expressed their understanding of HVC by providing examples and explaining what made their observations an instance of HVC or by citing specific definitions from outside sources.

*To me, high value care is when the amount of treatment and tests are minimized while considering the well-being of the patient. I have observed the physician wait to prescribe certain medications or start at a lower dose and have the patient return for follow-up to assess. This ensures there is enough time for the medication to work before adding more medications.* (S31)

*I feel [my preceptor] exemplified high-value care and her approach aligns with the initiatives of the Choosing Wisely campaign. Her requests for additional testing and treatment recommendations were evidence-based, not duplicative, and were necessary, all while providing excellent care for the patient.* (S92)

Another common way students expressed their understanding of HVC was by mentioning evidence-based best practice recommendations and tying in outside references used to address their questions from clinical observations.

*Once the Ottawa rules were introduced by my preceptor, I realized imaging was also not necessary in this case. The Ottawa rules give guidance on when to obtain imaging for ankle complaints and the fact that my preceptor uses it showed another example of high-value care.* (S01)

*Whenever there is a patient with hyperlipidemia at my clinical site, my preceptor always calculates their ASCVD risk score using the ACC-derived calculator. He does this with the patient in the room and explains how the ACC made this calculator. In addition to making the patient more confident in his decision making, my preceptor ensures that the medication is absolutely necessary and will benefit them.* (S170)

Some students presented HVC through the example of specific preventive health measures observed at their clinical sites, such as screening tests, or via patient counseling on lifestyle modifications.

*...what is often left unsaid in these conversations [about high value care] is the role of primary care physicians in counseling patients on a healthy lifestyle, including healthy diet and exercise, which can have a great impact on their health. I have benefited from learning more about how to counsel patients about these topics at my clinical site.* (S154)
3.3.2. Addressing Barriers to High-Value Care

Student essays, including a discussion of specific obstacles to high-value care, were counted for this theme (Figure 6). These essays were then examined further to assess whether a student’s reflections came from direct observations made at a clinic or whether they reflected on reasons for poor value in the U.S. health system independent of direct clinical observations.

Addressing Barriers to High-Value Care

![Diagram showing proportion of students from each class year, including a discussion about barriers to HVC in their reflection essays (a), and number of essays discussing HVC barriers that do or do not reference an observed instance of LVC (b).]

In some instances, respondents commented on systemic reasons for LVC after witnessing what they believed to represent an example of LVC.

Near the end of the appointment, my preceptor opened the conversation to reduce the dosage of the two medications, but...I felt like due to time constraints my preceptor couldn’t fully expand on that conversation. (S15)

I would often see patients prescribed drugs for mental health problems with no referrals for therapy. [My preceptor] told me the patient’s insurance did not cover therapy and they could not afford it. It is striking that some of the barriers to providing high value care and preventing further tests down the line are limited to factors outside of our control. (S31)

Other times, responders discussed systemic barriers to HVC independent of observed instances of LVC.

Another barrier that may happen is that a provider may not want to [miss a diagnosis]. Therefore, they will order every possible test and/or overprescribe to prevent [missing] a diagnosis. (S46)

I can envisage a scenario where a provider is not confident in their physical examination, history, or wants to be sure there is no acute ongoing pathology and send the patient off to the ER or refer to a cardiologist. Through an overly thorough work up, there is the possibility of uncovering incidental findings that would force further evaluation, thus compounding the number of resources required for resolution of this case. (S05)
3.3.3. Medical Waste and Underserved Communities

Student essays commenting on the impact of medical waste on underserved communities or reflecting on how medical decision-making is influenced by working with underserved patients were counted for this theme (Figure 7).

**Medical Waste and Underserved Communities**

![Figure 7](image_url)

**Figure 7.** Proportion of students from each class year discussing either the impact of LVC on underserved, at-risk communities or mentioning why HVC is especially important for these communities in their reflection essays.

Responders referenced the underserved communities they observed directly or learned about at their clinical sites via conversations with preceptors and framed their reflections on value-based care with respect to these communities.

*My site has a very large geriatric population as well and it is interesting to learn about how screening and treatment tend to become less invasive with age which further emphasizes the need for high-value care in this patient population.* (S169)

*The Mennonites do not believe in health insurance, so [my preceptor] said that whenever he took care of a patient from their community, he needed to be extremely intentional in every test that he ordered to keep their cost as low as possible.* (S112)

*Many tests and treatments are not affordable for many Americans with and without insurance, so any instance where I can offer a cheaper alternative while taking care of the physical and mental health of my patients is important to me.* (S81)

3.3.4. Patient–Physician Relationship and Value

Another major theme that emerged involved analyzing the nature of the patient–physician relationship and its potential influence on value-based medical decision-making. Examples where this relationship added value to a decision, as well as examples where the relationship had a negative impact on the value of a decision, were included in this thematic assessment. A total of 26 (28.9%) responders from the Class of 2024 and 45 (50.0%) responders from the Class of 2025 reflected on how the patient–physician relationships they observed influenced value in medical decision-making they observed (Figure 8).

Responders often mentioned the importance of trust between a patient and their physician in ensuring optimal delivery of care.

*Another aspect of high-value care is physician-patient trust. [When] patients struggle to trust their doctor, [this] is a red flag for whether they are receiving appropriate care.* (S07)

*“My child is now 13 years and the pediatrician has only prescribed antibiotics twice for my child so far, this is why we love coming here”. This statement made me look at high value care in a different way, which is that it does not only maximize the quality of care for the patients/children, but can also relieve a lot of stress for them, and help in building a trusting relationship between the patients and the healthcare provider.* (S74)
Similarly, effective communication between patient and physician was frequently identified as a significant contributor toward improving the value of care provided.

*My preceptor was Spanish-speaking and was able to communicate with his patients whose first language was Spanish. It allowed me to see how much of an opportunity this was for patients to connect with their physician and feel seen and heard. (S131)*

*With the patient’s past medical history of two different types of cancer, [my preceptor] approached the situation with empathy. I felt as though this situation highlighted high value care due to clear communication and creating a plan between physician and patient based in evidence and necessity. (S110)*

**Patient-Physician Relationship and Value**

![Proportion of students from each class year reflecting on how patient-physician relationships influence the value of medical decision-making.](image)

Figure 8. Proportion of students from each class year reflecting on how patient-physician relationships influence the value of medical decision-making.

### 3.3.5. Self-Reflection

Self-reflection emerged as a prominent theme across both class years and was counted for each instance a student mentioned what they learned or how they intend to apply new knowledge to future practice as a result of their experience. A total of 25 (27.8%) students from the Class of 2024 vs. 33 (36.7%) students from the Class of 2025 included various self-reflective elements in their essays (Figure 9).

**Self Reflection**

![Proportion of students from each class year engaging in higher-level self-reflection in their essays.](image)

Figure 9. Proportion of students from each class year engaging in higher-level self-reflection in their essays.

Overall, students engaged in self-reflection in a variety of ways, with some reflections going deeper than others. One common trait observed among essays containing a self-reflective element was an indication of intent to apply what was learned about HVC from clinical experiences to one’s own future practice as a physician or even as a senior medical student.
[My preceptor] asks patients directly about what they expect out of their treatment. He is placing patient autonomy at the forefront of the clinical scenario by reviewing all possible treatment options with the patient and subsequently asking for their input. As a future physician, I hope to implement this technique when treating patients with chronic conditions. (S56)

These observations have taught me more about what to focus on as a medical student, and will help me when I am going into clinical rotations next year. While the medical field will probably change a lot before we actually start working, the ability to identify relevant and necessary tests/procedures while excluding unnecessary ones will always be a good skill. (S119)

It is important to me that I maintain my motivation to learn after completing school and carry this into my time as a resident and physician. Unfortunately, it is easier to say this than do this. Working with [my preceptor] has shown me that high value care goes beyond the exam room and often occurs in the moments we aren’t with patients-brushing up on updated research, refreshing our memories about a rare case we see, etc. (S149)

Another pattern observed among students who engaged in self-reflection was the acknowledgment of specific learning that took place as a result of their clinical experience. This experience was a learning moment for me. My preceptor emphasized how important taking a good history can be for the care and outcome of the patient. He noted that the patient mentioned the pain came about after mowing his lawn and this led him to think that the condition was only musculoskeletal and not any of the more serious diagnosis. (S33)

My preceptor’s framework for conceptualizing Suboxone treatment has also shaped the way in which I view these patients. I unknowingly held a lot of bias towards addiction patients, mainly because I was working with limited knowledge that came mostly from popular culture. (S176)

My preceptor and I have spoken about how her practice has decided to have each female patient age 16 and up leave a urine sample so she can test for STI’s at their wellness visit. However, we haven’t talked about the rationale for having every patient leave a urine sample for screening urinalysis at each well visit regardless of their age or sex. I plan on getting my preceptor’s perspective on this at my next session. (S42)

4. Discussion

The relatively small body of literature describing physician learner experiences with HVC in the clinical setting highlights the important role of the learning environment in the development of clinical decision-making skills [27–29]. Introducing HVC as early as Y1 may establish HVC as a core competency among newly trained physicians across all specialties [30]. Importantly, the reflective essays and facilitated discussions provided insights into students’ emerging understanding and attitudes toward HVC, but they do not constitute definitive evidence of full integration into practice. In evaluating the impact of introducing HVC initiatives early in medical school, our preliminary findings reflect the potential for second-year medical students to integrate value-based care into their broader understanding of the practice of medicine. However, there remains a need for further research to assess the long-term integration and application of HVC principles. Nonetheless, our results support the appropriateness of introducing value-based care within the curriculum during the pre-clerkship years of medical school for two reasons. First, we were able to implement this curriculum without making significant changes to the existing course structure. Second, the event was evaluated in the same manner that other curricular initiatives are evaluated by students (post-event surveys), and these survey responses reflected the perception among respondents that this activity helped improve their ability to identify and practice HVC. Specific survey questions measured students’ self-reported knowledge of the Choosing Wisely campaign and value-based healthcare,
their discussions of these topics with preceptors, and their likelihood to look up Choosing Wisely recommendations. This suggests that early exposure enhances engagement and understanding. Moreover, an interesting feature of our design suggests that second-year students who were introduced to concepts of HVC during Y1 appeared more receptive to these HVC initiatives. Collectively, our findings complement the growing recognition that introducing the cost-conscious value of healthcare alongside related foundational medical knowledge during the pre-clerkship years of medical school may allow learners to more readily incorporate value into their clinical decision-making.

4.1. Appropriateness of HVC in Pre-Clerkship Curriculum

While value-based care is becoming increasingly incorporated into medical school curricula across the U.S., there remain questions related to how and when to introduce this topic during medical school. The ACGME Common Residency Program Requirements state that all residents must demonstrate competence in “incorporating considerations of value, equity, cost awareness, delivery and payment, and risk-benefit analysis in patient and/or population-based care as appropriate” [31]. While it can be argued that providing a dedicated HVC curriculum prior to clinical rotations might overburden medical students already tasked with learning a vast amount of information for the first time, we have integrated HVC content into existing medical school curricula in a novel way to minimize this pitfall. Moreover, Ryskina et al. found that first-year residents were more likely to be influenced by the modeling behaviors of attending physicians compared to senior residents, suggesting a tendency for modeling practices to have a greater impact on those earlier in medical training [32]. As such, it follows that allowing for earlier clinical exposure in medical school may encourage the internalization of value-based principles and subsequent adoption of HVC practices modeled in the clinical setting by precepting physicians.

Our results complement the existing literature supporting the introduction of HVC during pre-clerkship years of medical school. We used a combination of quantitative and qualitative methods to measure this. Baseline and post-event surveys were administered to assess students’ familiarity with HVC concepts and their perceived ability to identify and practice HVC. Notably, students from the Class of 2025, who had early exposure to HVC initiatives, reported higher baseline familiarity and more positive post-event responses compared to the Class of 2024. Specific survey questions measured students’ self-reported knowledge of the Choosing Wisely campaign and value-based healthcare, their discussions of these topics with preceptors, and their likelihood to look up Choosing Wisely recommendations. This suggests that early exposure can enhance engagement and understanding.

Additionally, reflective essays and facilitated group discussions revealed deeper engagement with HVC concepts among students with early exposure. Thematic analysis of the essays identified five major themes: understanding HVC, addressing barriers to HVC, medical waste and underserved communities, patient–physician relationship and value, and self-reflection. For instance, students from the Class of 2025 more frequently commented on how the patient–physician relationship influenced value-based decision-making and engaged in self-reflection on what they learned and how they intended to apply these insights in their future practice. The facilitated discussions complemented the essays by providing a platform for students to share their reflections, learn from their peers, and engage in critical thinking about value-based care. Comparing responses between the two class cohorts, the Class of 2025 demonstrated a more nuanced understanding of HVC, further supporting the effectiveness of early introduction. These findings underscore the value of incorporating HVC education early in medical training to foster a foundational understanding of cost-conscious, value-driven care.

The difference in learning environments due to the COVID-19 pandemic also highlighted the benefits of early and consistent exposure. The Class of 2024 had more significant disruptions to their clinical training, yet the positive reception of HVC initiatives among the Class of 2025 underscores the importance of early HVC education. The Class of 2025, with
more consistent clinical exposure, showed a better grasp of value-based care principles and were more receptive to the dedicated HVC event in Y2. This combination of quantitative survey data, qualitative analysis of reflective essays, and the context of the COVID-19 pandemic supports the appropriateness and effectiveness of early HVC education.

Another concern surrounding the introduction of a dedicated HVC curriculum during undergraduate medical education relates to medical students’ perception of their own ability to improve the value of the care received by their patients during medical school. In other words, if medical students do not feel they are in a position to make a meaningful impact in lowering healthcare costs, will this interfere with how HVC education is received in the first place? Shelke et al. found that a primary limitation in value-based education is the need for “instilling the belief that [medical students themselves] have a role to play in controlling healthcare costs” despite widespread interest in the topic [33]. Moreover, Perez et al. found that first-year resident physicians desired “a more systematic approach to HVC teaching that includes the development of a stable generalizable framework for decision-making, objective data, and standardized assessment”, contrasting the traditional approach, which emphasizes reducing the overuse of certain practices [34]. We found that responders from both class years felt that the dedicated HVC event aided their ability to identify factors contributing to LVC and would help them practice HVC as medical students. The reflective nature and small-group discussion structure of this HVC event allowed students to make nuanced insights on value in medicine and may reflect a higher-level engagement with these topics than may have been achieved through memorization of testing practices alone.

4.2. Discovering Value through Clinical Exposure

The negative impact of the COVID-19 pandemic on undergraduate medical education is well documented, particularly with regard to clinical experiences [35,36]. For this reason, the differential nature of clinical exposure in Y1 was an important consideration when evaluating observed differences in quantitative and qualitative responses of the two student cohorts in our study. Students from the Class of 2024 had a pre-clerkship clinical experience more heavily influenced by the COVID-19 pandemic in their first year (2020–2021) compared to students from the Class of 2025 (2021–2022). Specifically, Class of 2024 students had fewer clinical weeks overall (12 compared to the usual 15) and were more likely to have had restrictions placed on their interactions with patients due to safety concerns present at the time. Moreover, Class of 2024 students experienced a Y1 curriculum delivered primarily in a virtual format, which may have also influenced the nature of their interactions with preceptors and patients in the clinical setting. Importantly, students from the Class of 2024 did not have exposure to the HVC initiatives in Y1, as these were introduced for the first time to both class years during the 2021–2022 academic year. For this reason, the observed differences in response among the two class years for the baseline survey may relate to these learning environment contexts (Figure 3). Similarly, the improved receptivity to a dedicated HVC event in Y2 (Figure 4) might be expected for Class of 2025 responders due to their comparatively higher familiarity with the topic and more clinical exposure during Y1 on which to reflect.

Self-reflection as a learning modality has gained popularity within medical education at both the undergraduate and graduate levels. The ACGME requirement for residents and fellows to “self-reflect on their practice and identify areas for improvement” suggests that medical students should be adequately prepared for this skill [31]. Reflective practice is thought to enhance clinical practice, patient-centered care, and critical thinking and problem-solving skills [37,38]. Moreover, the use of self-reflection in developing novel HVC curricula has shown promise in helping students identify examples of LVC as well as barriers to the implementation of HVC measures [39]. Our study corroborated these findings as one of the five prominent themes to emerge from student reflection essays involved discussing LVC with or without input on systemic barriers to HVC. It may be argued that the emergence of this theme might be anticipated, given that value in medicine is often presented to learners from the perspective of eliminating wasteful medical practices.
We stratified this theme further to evaluate whether learners with variable Y1 clinical exposure were more or less likely to frame their reflections on causes of LVC in terms of systemic barriers to HVC. There was no clear correlation between limited Y1 clinical exposure and a tendency to discuss systemic contributors to LVC. That said, it is interesting to note that learners from the Class of 2024 were about 1.75× as likely to write about LVC overall. While not often directly stated as such throughout the reflection essays, the impact of the COVID-19 pandemic is one possible factor contributing to a tendency toward this observation, as the pandemic highlighted the shortcomings of our overburdened health system. On the other hand, it is also possible that Class of 2024 responders not exposed to the HVC initiatives in Y1 had a more limited understanding of HVC and felt better equipped to comment on instances of an absence of value.

The difference in Y1 clinical exposure between our two student cohorts is perhaps most readily apparent in Theme 4 and, to a lesser extent, Theme 5. Students from the Class of 2025 tended to more frequently comment on their observations of how the patient–physician relationship contributed to value in medical decision-making (Theme 4) and to self-reflect on what they learned and/or what they hope to apply to their own future practice (Theme 5). These differences highlight the potential influence that early clinical exposure has on promoting engagement with and developing a nuanced understanding of a topic like HVC. Nevertheless, responders from both class years were able to name specific examples experienced by their patients in describing how the patient–physician relationship contributed to value-based care. For example, a patient’s ability to trust their physician meant better adherence to medications and lifestyle modifications (S07), as well as avoiding harm through the prevention of undue stress associated with medical appointments (S74). Similarly, students also wrote about how effective communication contributes to HVC and cited examples of physicians talking to patients directly in their native languages as opposed to using translators (S131) and approaching conversations with empathy while promoting shared decisions based on evidence and necessity (S110).

Both student cohorts demonstrated instances of higher-level self-reflection in their essays. In some cases, these reflections touched on the transformative impact of uncovering one’s own hidden biases toward certain marginalized patient groups (S176). Most frequently, students reflected on an observation that informed how they hope to practice medicine in the future, or they commented on something they learned. With regard to applications toward future practice, students also mentioned what they hoped to incorporate as senior medical students on clinical rotations (S119) vs. practices they intended to follow as physicians further down the road (S56, S149). Some students were able to draw connections between fundamental material learned very early in medical school, such as history-taking and improving the value of the care received by patients (S33). Other students demonstrated engagement with HVC initiatives by critically assessing clinical practices and taking proactive steps, such as following up with clinical preceptors the following week (S42). Altogether, these responses suggest that, when combined with reflective practice, introducing HVC principles early in medical school may be highly effective at establishing value as a foundational component of medical training.

4.3. Impact of Early Clinical Exposure and Reflective Practice on Student Engagement

The relatively small body of literature describing physician learner experiences with HVC in the clinical setting highlights the important role of the learning environment in the development of clinical decision-making skills [38,40]. Introducing HVC as early as Y1 may establish HVC as a core competency among newly trained physicians across all specialties [16]. Our results support the appropriateness of introducing value-based care within the curriculum during the pre-clerkship years of medical school. Moreover, an interesting feature of our design suggests that second-year students who were introduced to concepts of HVC during Y1 appeared more receptive to these HVC initiatives.

Engagement with high-value care (HVC) topics was notably influenced by early clinical exposure combined with intentional self-reflection and facilitated group discus-
sions. Our surveys showed increased confidence and perceived ability to practice HVC among students with early exposure, particularly in the Class of 2025, who reported higher baseline familiarity and more positive post-event responses. Reflective essays revealed significant depth in students’ understanding, with themes such as medical waste and the patient–physician relationship emerging organically. Feedback from group discussions underscored the value of peer learning and critical dialogue, with students appreciating the diverse perspectives shared. This is supported by the existing literature that highlights the effectiveness of reflective practice and group discussions in enhancing critical thinking and the application of theoretical knowledge in clinical settings [37,41,42]. These findings align with constructivist learning theory, which posits that learners construct knowledge through active engagement and reflection on experiences [43,44]. Early clinical exposure provided practical experiences that helped students contextualize their learning, making theoretical concepts more tangible and relevant.

4.4. Strengths and Limitations

The mixed methodology employed for this work yields rich and insightful data as well as limitations. Using an abductive, progressive focusing approach to analyzing student open-response essays allowed us to account for both anticipated themes in addition to themes that arose organically. Combining quantitative approaches to compare the two class cohorts helped guide our inquiry during the thematic appraisal of each group. While our methodology provided valuable insights, a few key limitations exist. Given our abductive approach, we must acknowledge that our interpretations may be reasonable but tangential. Participation was limited to pre-clerkship medical students, and all data were obtained prior to starting clerkship rotations. Considering this project relied on students receiving clinical exposure during their first year of medical school, the absence of early clinical exposure uniformly across all U.S. medical schools represents a potential lack of generalizability. Another potential limitation of our study is the influence of students’ years of study on their confidence and self-ratings. It is important to acknowledge that Y2 medical students may have more clinical experience and knowledge compared to Y1 students. This difference in experience could lead Y2 students to feel more equipped and confident in their ability to identify and practice high-value care (HVC), which may have influenced their responses in the post-event survey. Y2 students have had more time to develop their clinical skills and familiarity with medical concepts, which may enhance their ability to engage with HVC principles effectively. In contrast, Y1 students, being at an earlier stage in their training, may lack the same level of confidence and may underrate their abilities due to less clinical exposure and knowledge. This discrepancy in self-assessment between the two cohorts could impact our findings, as Y2 students might inherently feel more capable of practicing HVC irrespective of the intervention. To address this limitation, future studies should consider implementing objective measures of HVC competence alongside self-assessment surveys. Such measures could include standardized patient encounters, clinical simulations, or faculty evaluations to provide a more comprehensive and accurate assessment of students’ abilities to practice HVC. Additionally, longitudinal studies tracking students’ progress from Y1 through Y2 and beyond could help elucidate how confidence and competence in HVC develop over time. By incorporating these approaches, we can better account for the variability in confidence and self-ratings due to students’ years of study and provide a more robust evaluation of the impact of early HVC education on medical students’ clinical practice.

4.5. Future Research

In order to enhance the reliability and validity of findings related to subjected assessments of engagement, future studies should incorporate the REFLECT rubric or a similar tool in future analyses to provide a more objective and consistent evaluation of reflective essays. Investigating students longitudinally throughout their entire four years of medical school across a variety of institutions should be the focus of future research.
This will allow for an examination of (1) how introducing HVC early in medical school influences the practical application of HVC during clerkship rotations, (2) how well prepared graduating medical students feel about practicing HVC in residency, and (3) the feasibility of adopting novel HVC initiatives to complement existing pre-clerkship curricula across all U.S. medical schools. Additionally, future research should assess the long-term impact of early HVC education on medical students’ clinical practice. We recognize that longitudinal studies following students through their clinical years and into residency, while practically challenging to conduct, will be essential to evaluate the sustainability and practical application of value-based care training. Lastly, for future studies, we will consider using a consistent set of questions across pre- and post-intervention surveys to better demonstrate improvement.

5. Conclusions

As medical students begin their training to become physicians, they are tasked with learning a vast amount of scientific information while also learning about the profession of medicine itself. This includes the nuanced challenges of providing patient-centered care working within the U.S. health system, as well as evidence-driven, cost-conscious care. In this study, we demonstrate how pre-clerkship medical students can meaningfully engage with topics related to HVC, integrating value as a foundational component in their understanding of medical practice. Engagement with these topics was associated with early clinical exposure and intentional self-reflection, complementing group discussion. Moving forward, our findings advocate for the widespread early integration of HVC principles into medical school curricula, fostering a generation of physicians committed to delivering value-based, patient-centered care.

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Appendix A

Appendix A.1. HVC Pearl Example

Pearls added to the end of weekly assigned readings all contained the mission statement of the Choosing Wisely campaign. Below is a pearl provided during a week in which vascular history and physical examination was the covered topic [45].
The mission of the Choosing Wisely campaign is to promote conversations between clinicians and patients by helping patients choose care that is:

- Supported by evidence
- Not duplicative of other tests or procedures already received
- Free from harm
- Truly necessary

Choosing Wisely Weekly Pearl: Don’t initiate antihypertensive treatment in individuals ≥60 years of age for systolic blood pressure (SBP) <150 mm Hg or diastolic blood pressure (DBP) <90 mm Hg.

Notes: There is strong evidence for the treatment of hypertension in older adults. Achieving a goal SBP of 150 mm Hg reduces stroke incidence, all-cause mortality and heart failure. There is less consistent evidence that lower BP targets are beneficial for high-risk patients, especially frail patients in the post-acute and long-term care setting. Target SBP and DBP levels should be based on shared decision-making with the patient as there is data supporting benefit in treating more aggressively to a goal SBP of <140 mm Hg in community-dwelling individuals ≥75 years of age with elevated cardiovascular risk. Using a reliable, representative method of taking blood pressures with special attention to orthostatic hypotension is important, as orthostatic hypotension has been associated with increased mortality and cardiovascular events. In addition, moderate or high-intensity treatment of hypertension has been associated with an increased risk of serious falls and injury in frail older adults.

Source: AMDA – The Society for Post-Acute and Long-Term Care Medicine

Figure A1. Representative HVC “pearl” compiled from specialty-specific guidelines published as part of the Choosing Wisely project.

Appendix A.2. Essay and Discussion Prompts Used for HVC Event

The open-ended nature of the pre-event prompts aimed to encourage students to think broadly and deeply about their clinical experiences, which facilitated the emergence of diverse themes. Reflection essay prompts provided to students were as follows:

Thinking back on your clinical experiences during first year and even before medical school, write a short (suggested limit: 400 words) reflection on the topic of value-based care. You may consider writing about instances of either high- or low-value care you have observed. If you cannot think of an example, then reflect on how you imagine yourself practicing high-value care as a physician. Here are some open-ended questions to get you thinking. You may respond to them or you may choose to write about something else. You may type your responses directly into the box below.

- Why does providing high-value care matter?
- What are barriers to high-value care?
- How will focusing on value affect the way you practice within your particular specialty?
- How comfortable do you feel discussing cost of care with patients?
- Do you feel like you have access to information about costs of medical procedures/tests?
- What are the consequences of low-value care?

Discussion prompts provided to faculty:

- Have students discuss their own reflections on high-value care and then share their observations and thoughts from reading the reflections of their peers.
- Think about what the worst possible hospital (or hospital system) would look like in terms of value. Discuss aspects of this hypothetical hospital that contribute to such poor value. What features of this hospital are easier to fix than others? What can a physician working in such a setting do to improve health care value for their patients? One consideration is encouraging the formation of consensus guidelines within an institution/hospital.
- What are reasons why clinicians over-test?
  - If not mentioned, the following points can be brought up and discussed further:
    - Belief that ordering many tests will help detect subclinical disease
    - Defensive medicine
    - Lack of knowledge and confidence
- Patient expectations
- Profit

Discuss the role of defensive medicine in over-testing. Note: 91% of physicians recently surveyed reported that ordering more tests or procedures than needed to protect themselves from malpractice suits. Evidence suggests that failure to follow-up creates almost as many medicolegal problems as failure to diagnose [46].

Where can a clinician go to search for evidence-based guidelines for their particular specialty?
- Choosing Wisely website: it’s very easy to search for recommendations here
- Institution-specific practices and specialty-specific recommendations as well as the importance of staying up to date on current research within your own field

Why high-value care isn’t just “saving dollars” or “cutting costs”

Discuss patient-centered barriers to high-value care—patient education, resource use, health literacy, etc.

Discuss physician-centered barriers to high-value care—in addition to defensive medicine, what about “re-education” for veteran physicians? Rural settings where ideal resources aren’t available?

For learners early in their medical training, why isn’t “high-value care” we are learning now be the best possible care already? What might cause the care we provide to become low-value?

What can physicians do in terms of advocacy to reinforce value as it relates to health-care expenditure?

Navigating a conversation where the patient is insistent about ordering a test that is not considered valuable by board standards—should physicians always say no?

Some specialty-specific practice recommendations have been corrected or declared outdated—is this a strong concern for what standards of care should be?

Why do you think we are talking about high value care this early in your medical education?

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