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Strategies for Teaching Uncertainty Tolerance in Medical Education: A Qualitative Study

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Abstract

Objectives: To examine how experienced healthcare educators conceptualize and teach uncertainty tolerance and identify strategies to inform medical education curricula for complex, unpredictable clinical environments.

Methods: We conducted a qualitative phenomenological study with 15 healthcare educators during a multiday, high-fidelity prehospital simulation at a United States military-affiliated medical training facility. Participants completed semistructured interviews, a demographic questionnaire, and the Intolerance of Uncertainty Scale–Short Form. Interviews were transcribed and analyzed using iterative coding and constant comparison to identify themes grounded in participants' lived experiences. This study was reported in accordance with the Standards for Reporting Qualitative Research guidelines.

Results: Four themes emerged: (1) confidence through exposure—early, repeated, realistic practice fosters automatic responses under pressure; (2) safety fosters engagement—psychological safety, supportive leadership, and diversity of thought encourage active engagement with uncertainty; (3) growth through insight—structured reflection, constructive feedback, and learning from mistakes promote development; and (4) navigating ambiguity with flexible thinking—cognitive flexibility, probabilistic reasoning, and philosophical reframing support decision-making without paralysis.

Conclusion: Uncertainty tolerance is a teachable, multifaceted competency. Curricular strategies should include early and repeated exposure, psychologically safe learning environments, structured reflection, and training in flexible thinking. Integrating these elements, particularly in high-stakes specialties like emergency medicine, may improve clinical reasoning, patient care, and clinician

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Abstract (continued)

resilience. These findings serve as a foundation for further research to empirically examine how such approaches influence clinical reasoning, patient care, and clinician well-being.

Keywords: *uncertainty tolerance, medical education, emergency medicine, qualitative research, experiential learning, psychological safety, cognitive flexibility*

1 INTRODUCTION

1.1 Background

Emergency medicine physicians operate in high-stakes environments where uncertainty is constant, requiring them to make critical decisions amid ambiguity, dynamic conditions, and resource limitations.[1-4] When physicians struggle to tolerate uncertainty, patient care can suffer through overtesting, delayed decision-making, or excessive reliance on algorithms rather than nuanced clinical judgment.[5,6] Moreover, a low tolerance for uncertainty has been linked to heightened psychological distress, burnout, and professional dissatisfaction among physicians.[2,7]

Despite the inherent uncertainty of modern clinical practice, traditional health professions education may emphasize factual knowledge, standardized protocols, and algorithmic reasoning. Although these elements are essential for safe and effective care, they may leave students underprepared to navigate the inherent ambiguity of real-world clinical work. Overall, medical students often receive little formal instruction in recognizing, tolerating, and managing uncertainty.[8] Instead, they may assume that uncertainty signals incompetence or professional failure.[2,6] As healthcare becomes increasingly complex, the capacity to manage uncertainty is now recognized as a critical professional competency, crucial not only for patient safety but also for physician well-being and ethical practice.[1,5]

1.2 Importance

Although its importance is increasingly recognized, uncertainty tolerance remains an underdeveloped domain within medical education.[4] Scholars have described uncertainty tolerance as a core physician competency, but few medical schools currently offer structured educational programs specifically designed to cultivate this skill among students.[1,5] Although existing literature offers theoretical definitions and broad recommendations,[4] there is limited practical guidance on how to teach uncertainty tolerance effectively. This gap is especially significant in contexts like emergency departments and disaster response efforts, where healthcare professionals routinely confront high levels of uncertainty.[2]

1.3 Goals of This Investigation

To address this educational gap, we conducted a study to inform the teaching of uncertainty tolerance. When designing our study, we delved into theories such as experiential learning theory, which promotes "hands-on" learning.[9] We also reviewed cognitive flexibility theory, which suggests that experts in complex fields can consider multiple perspectives and adapt to fluctuating circumstances.[10] Finally, we noted that philosophical frameworks such as Stoicism and cognitive-behavioral principles offered strategies for managing emotional responses to uncertainty, fostering resilience and adaptability.[6]

Guided by these theoretical perspectives, we sought to explore how experienced healthcare professionals perceive the most effective ways to teach uncertainty tolerance. Specifically, our study aimed to understand how seasoned educators conceptualize uncertainty tolerance and how their insights can inform the development of educational curricula for medical students. Ultimately, understanding how these educators develop and teach tolerance of uncertainty can help inspire targeted interventions to better prepare future physicians for the complex and ambiguous realities of clinical practice. Such preparation is crucial not only for improving patient care and clinical reasoning, but also for reducing the risk of burnout and preserving physicians' professional well-being.[1,2]

2 METHODS

2.1 Study Design and Setting

We conducted our study during a multiday, high-fidelity prehospital simulation at a military-affiliated medical training facility in the United States. We chose a qualitative phenomenological design to explore how experienced healthcare educators understand and teach uncertainty tolerance and how their perspectives could inform a curriculum for medical students. We selected a qualitative research design to thoroughly examine participants' experiences, perceptions, and nuanced insights that might not emerge through quantitative measures alone. Rooted in the tradition of phenomenology, this approach centers on understanding the essence of participants' lived experiences and perceptions, allowing us to capture the meanings they ascribe to their encounters with uncertainty. This rich, descriptive data will help inform the further development of testable hypotheses and innovative curricula.[11] Furthermore, a qualitative approach is especially important for research in complex fields like emergency medicine, where human factors, decision-making processes, and environmental influences intersect in ways that merit deeper exploration.[12] This study was determined to be exempt from Institutional Review Board (IRB) review because it involved minimal risk to participants and met the federal

The Bottom Line

How can educators teach future physicians to handle uncertainty with confidence? In this qualitative study, 15 experienced healthcare educators shared how they help learners build comfort with the unknown. They emphasized early exposure to unpredictable situations, psychological safety, reflection, and flexible thinking as essential teaching strategies. These educator insights provide a foundation for developing curricula that prepare medical students to think clearly and act decisively when outcomes are uncertain.

criteria for exemption under 45 CFR 46.104(d)(2), research involving the use of educational tests, survey procedures, interview procedures, or observation of public behavior, provided that information obtained is recorded in such a manner that human subjects cannot be identified. In our study, all participants were adult educators who volunteered to take part, no sensitive or personal information was collected, and all data (including interview transcripts and questionnaire responses) were deidentified prior to analysis. The IRB at the authors' institution reviewed the study protocol and issued a formal determination of exemption on these grounds. This study was reported in accordance with the Standards for Reporting Qualitative Research guidelines.

We developed our interview questions through a rigorous process to ensure relevance and clarity. First, we conducted a literature review to identify key themes and gaps related to our study topic. Building on these findings, we convened a panel of emergency medicine experts who contributed their practical insights and helped refine the questions for clinical and contextual appropriateness. Finally, we piloted the draft interview protocol with a small group of participants, allowing us to assess question clarity and flow and to make necessary adjustments before launching the full study.

Participants were also asked to fill out a brief questionnaire that consisted of demographic questions, including questions about their military experience, healthcare professional experience, and age. Following the demographic items, participants were asked to complete the shortened Intolerance of Uncertainty Scale (IUS-12), a 12-item scale measuring individuals' ability to manage and comfort with unexpected, ambiguous, or surprise scenarios.[13] The IUS-12 consists of 12 items rated on a 5-point Likert scale (1 = "Not at all characteristic of me" to 5 = "Entirely characteristic of me"), yielding total scores ranging from 12 to 60, with higher scores indicating greater intolerance of uncertainty. Our participants' mean score of 20.27 (SD = 5.16) reflects *relatively low* intolerance of uncertainty—consistent with prior research showing that healthcare professionals typically demonstrate greater tolerance for ambiguity than general populations.[14] Knowledge of participants' personal ability to tolerate uncertainty acts as an additional demographic factor in this study, as all the participants are teachers of uncertainty tolerance.

2.2 Selection of Participants

Participants were both male (n = 9) and female (n = 6) experienced healthcare educators, including emergency medicine physicians, nurses, physician assistants, a surgeon, and allied health professionals who were serving as faculty during the simulation. All participants were actively involved in health professions education, possessed significant experience working in the healthcare profession, and reported low levels of uncertainty intolerance (see Supplementary Appendix 1 for participant demographics). We recruited participants from a variety of specialties so that we could capture diverse perspectives on clinical decision-making, interprofessional collaboration, and educational priorities within the simulation environment, factors that are critical to the team-based, high-acuity setting characteristic of emergency medicine.

2.3 Sampling and Recruitment

Our research team used purposive sampling to recruit participants who could offer a variety of in-depth perspectives on teaching uncertainty tolerance. Selection criteria included active involvement in health professions education and clinical experience in high-stress prehospital environments. To recruit our participants, we approached healthcare educators participating in the prehospital simulation and invited them to join the study. In total, 15 participants volunteered for our study. Each participant completed at least 1 interview, and 3 participants voluntarily returned for additional interviews to share further insights.

2.4 Data Collection

Our research team members conducted semistructured, in-person interviews with each participant. Each interview lasted an average of approximately 30 minutes and was followed by the brief questionnaire containing the IUS-Short Form measure. Our interview guide included open-ended questions exploring participants' perceptions of and experiences with teaching and modeling uncertainty tolerance in health professions education (eg, "What is the best way to teach uncertainty tolerance?") (see Supplementary Appendix 2 for interview protocol). We continued conducting interviews until our research team determined that no new concepts were emerging and that saturation had been reached. The paper questionnaires were collected and synthesized for digital

analysis using Jamovi version 2.3.28. We audiorecorded each interview and transcribed the recordings using Scribe, an automated transcription service. We reviewed each transcript for accuracy and deidentified the data before analysis.

2.5 Analysis

Our primary research team consisted of (1) an MD emergency medicine physician with a master's degree in health professions education and with extensive experience conducting qualitative research, (2) a PhD curriculum researcher with a master's degree in education and expertise in qualitative research methodology, and (3) a medical student who received training in qualitative data analysis methods. Involving multiple researchers in the analysis helped increase the credibility and trustworthiness of our findings. We maintained an audit trail to document our decisions and enhance transparency throughout the research process, including our efforts to bracket our biases that may have impacted our interpretation of the data.

We analyzed the interview transcriptions to identify themes and subthemes reflecting participants' lived experiences and shared meanings following the steps of phenomenological data analysis. We first individually read all transcripts multiple times to immerse ourselves in the data and developed initial codes. We then met regularly to discuss and refine codes, ensuring that our interpretations remained grounded in participants' voices and experiences. In our regular research team meetings, we discussed any discrepancies in coding and theme development until we reached consensus. Finally, through constant comparison, we manually grouped codes into broader categories and developed overarching themes. Participant demographic information and responses to the IUS-Short Form measure were entered and managed in Jamovi version 2.3.28 by a member of our research team with a master's degree in experimental psychology.

3 RESULTS

Four themes emerged from our qualitative data analysis regarding curricular elements for teaching uncertainty tolerance: (1) confidence through exposure, (2) safety fosters engagement, (3) growth through insight, and (4) navigating ambiguity with flexible thinking (see Fig).

3.1 Theme 1: Confident Through Exposure

Our participants foremost emphasized that building tolerance for uncertainty and effective performance in unpredictable environments fundamentally relies on practice, repetition, and realistic exposure.

3.2 Early Exposure Builds Tolerance

Many participants noted that introducing learners early to uncertain, variable, or low-resource situations is critical for fostering tolerance of uncertainty. As 1 participant described, "Exposing it to them early on" (P9) was viewed as key to preparing trainees for the realities of unpredictable work environments. Another elaborated, "Teaching them how to navigate a low-resource environment and be resilient and adaptive will build up a tolerance of uncertainty…" (P11). Our participants also described deliberate curricular efforts to embed uncertainty, such as "Unregulated missions… you have to react very quickly to an unknown patient… That's one way in which we throw uncertainty into our curriculum and training." (P14). Overall, our participants valued early exposure for normalizing discussions around uncertainty: "Exposure has been a huge thing for me…exposing them to those experiences and talking about it." (P4).

3.3 Repetition and Muscle Memory

Along with early exposure, repetition proved essential for turning knowledge into automatic responses under pressure. Participants highlighted that frequent rehearsal enables the development of "muscle memory," which reduces cognitive load during real-world challenges. One participant noted, "Muscle memory, constant repetitions… As long as you know exactly what to do, it shouldn't… You don't have to think about it." (P8). Repeated practice was seen as essential: "So if you have the knowledge and you keep practicing the knowledge and skills over and over, it just will come automatically." (P8). Participants also noted the value of rehearsals: "Rehearsals are important. You can rehearse all different kinds of things because… the more things you come up with to rehearse on, the less of a surprise they are when they actually happen." (P10). The cumulative effect of repetition was described succinctly: "Just doing this kind of stuff over and over and over and over and over… I think it's a good way to ease them into things." (P9).

3.4 Realistic Training and Stress Exposure

Beyond mere repetition, participants described the critical role of realistic and stress-inducing training experiences in preparing learners to manage uncertainty. "I think the biggest thing to me is just realistic training that's beyond what their capabilities are… putting them under stress where they have to make decisions that may not be in line with their expectations." (P13). Conversely, participants noted that not becoming accustomed to uncertainty leaves individuals more prone to stress when uncertainty arises. One explained: " If you're not willing to accept uncertainty, you're at a high state of stress all the time because your mind is always trying to predict everything that can happen." (P13). Overall, practical engagement was viewed as more valuable than purely theoretical knowledge: "Not necessarily, but I could read books forever and not have it. But I've actually practiced, and that repetitive practice in different spaces gives me a different perspective than they have now." (P1). Another participant reinforced the importance of first-hand experience: "You can have all the knowledge in the world, but if you haven't been through certain situations, I don't believe you're going to be mentally or physically prepared for them." (P9). Participant 8 echoed: "Prep for anything possible…try not to let it rattle you." (P8).

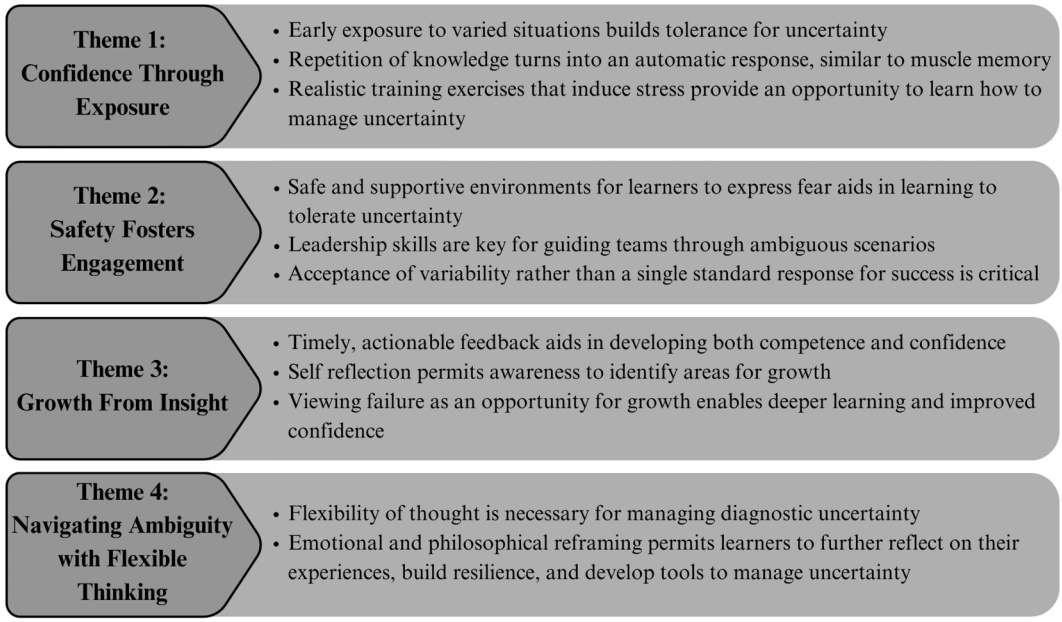

FIGURE. Emergent themes.

3.5 Theme 2: Safety Fosters Engagement

In addition to frequent and realistic training, our participants underscored the importance of student comfort. They described the important role of organizational culture, leadership approaches, and psychological safety in shaping individuals' capacity to manage uncertainty.

3.6 Creating Safe and Supportive Environments

Establishing psychological safety emerged as foundational to helping individuals tolerate and navigate uncertainty. As 1 participant explained, "Creating a culture of safety. If you've done everything that you can in your ability and your power, recognize that you are not perfect." (P11). Psychological safety was described as deeply personal and rooted in trust: "So creating that culture of safety requires you to feel safe in those things that are most important to you." (P11). Participants highlighted the importance of intentionally crafting supportive spaces: "So create a safe space for them too." (P6). Finally, team-based approaches were viewed as crucial for confidence building: "Approaching it with more of a team attitude… people's own self-beliefs stop them from being okay with being uncertain." (P2).

3.7 Leadership Training for Managing Uncertainty

In addition to this focus on safe and supportive environments, our participants underscored that leadership skills are pivotal in guiding teams through ambiguous and high-stakes situations. "I think as a leader, you probably keep your eyes on a big level and then give your team some room to navigate the uncertainty." (P6). Leadership development was perceived as a deliberate process, including opportunities for all team members to practice their leadership skills: "A lot of team-building skills for sure… switching out that leader to other non-traditional people… make them the leader so that they can also see your point of view." (P8). Such experiences were seen as crucial for building empathy and mutual trust: "In training, give everyone a chance to lead, so they understand what it takes in that moment, and they have more trust in the leader." (P8).

3.8 Diversity of Thought and Acceptance of Variability

The participants also described how diversity of thought was a means of managing uncertainty. "Diversity of thought can help people to tolerate uncertainty because there's not always one right answer." (P1). Participant 1 also reflected on the notion that competency is not a single standard but can manifest in various approaches: "Competent means different things, can mean 2 different people with different approaches can both be competent." Additionally, creating an egalitarian working environment was highlighted as critical for integrating diverse perspectives: "I like to work with physicians and all levels of providers that we have a collegial relationship… not like, 'I'm better than you because I went to school longer.'" (P4).

3.9 Theme 3: Growth Through Insight

Our participants highlighted that the capacity to tolerate and navigate uncertainty is not solely built through external experiences but also through deliberate internal processes such as reflection, feedback, and cultivating self-awareness.

3.10 Constructive Feedback

Receiving timely, actionable feedback was regarded as essential for developing competence and confidence in uncertain situations. For example, one participant explained, "Feedback. In our unit, we do a lot of constructive criticism… We're very blunt." (P8). However, several participants noted a gap in structured feedback opportunities beyond medical school. Participant 6, for example, notes that "having somebody else provide that feedback… you don't get that a lot after medical school." Ultimately, feedback was emphasized. "Useful, timely, actionable feedback is important." (P15).

3.11 Reflection and Self-Awareness

In addition to quality feedback, participants identified reflection and self-awareness as fundamental for processing uncertainty and learning from experiences. As 1 participant noted, "I think self-awareness is like the thing that keeps coming to mind." (P6). However, reflection was not perceived as a continuous activity but rather as one requiring intentional time and space: "Reflection, I think it can't always be a constant thing… you have to be exposed to it, be given time to process it." (P4). Our participants also highlighted the importance of balancing critique with recognition of strengths. Participant 4, for example, noted that "normalizing it… [your response] wasn't the greatest part of it, but you did all of these things really well." Educators described incorporating structured reflection into learning experiences: "I think that reflection piece is key and something that we can easily ask our students to do." (P3). The participants finally viewed reflection as a tool for confronting uncertainty directly: participant 1 described how structured reflection was "an ideal opportunity to confront uncertainty afterwards… specifically asking the question, 'How did you feel getting handoff from another group about their patients? Did that make you question your care?'"(P1).

3.12 Learning From Failure and Mistakes

Coupled with reflection, participants emphasized that growth in handling uncertainty often arises from learning through failure. Participant 5 offered a clear example from clinical education: "I think it's great when a student fails a test, they come in, retrain and remediate and take the exam and feel 1000% more confident on the information." The act of recovering from setbacks was seen as vital for deeper learning and improved future performance. Participants cautioned, however, that repetition alone is insufficient. Participant 1 noted that "Part of the reps has to be learning from your mistakes. That's part of doing it. You can't just do it a million times blindly or 10,000 times blindly. That's not learning, that's a machine."

3.13 Theme 4: Navigating Ambiguity With Flexible Thinking

The final theme we identified was the need to be able to navigate ambiguity with flexible thinking. Participants articulated that effectively navigating uncertainty requires more than technical expertise; it demands deliberate cognitive strategies, a flexible mindset, and philosophical reframing.

3.14 Cognitive Flexibility and Clinical Reasoning

The participants in our study identified cognitive flexibility as essential for managing diagnostic uncertainty and avoiding premature closure. One participant (P6) emphasized the importance of routinely generating multiple possible diagnoses to prevent anchoring, noting, "I try really hard… to make sure that the residents are always coming up with at least 3 possible diagnoses… so that they can't anchor on one," and adding, "Three diagnoses is more uncertain than one… that might be a way to start teaching people."

However, our participants also acknowledged that broader diagnostic perspectives can have drawbacks. As participant 15 explained, "Sometimes increased knowledge increases their uncertainty… they have analysis by paralysis… And sometimes you're going to be wrong and you just have to be okay with being wrong." Others framed decision-making as a probabilistic process, with participant 10 describing it as "basically a risk assessment—what's the most likely thing to happen in these situations?"

3.15 Philosophical and Emotional Framing

Beyond cognitive strategies, our participants highlighted the importance of philosophical and emotional reframing as essential tools for living with uncertainty. Several participants advocated focusing on known facts as an anchor amidst ambiguity. "Focus on what you do know and drive that…what are the facts here?" (P3). Resilience was also mentioned as a necessary attribute: "Resiliency in the face of the unknown or unknown adversities." (P3). Our participants finally defined uncertainty tolerance as the capacity to act decisively: "Uncertainty tolerance is probably the ability to make a decision or do an action even without all the details." (P6).

Our participants finally reflected on deeper philosophical dimensions of uncertainty, suggesting that a lack of language might contribute to discomfort with ambiguity. For example, participant 1 reflected "that's why we struggle with uncertainty, is because we either don't have the language for it… or we aren't trained to live in happy and sad at the same time… and maybe that's part of the problem." This participant also summarized the tension between knowledge and uncertainty inherent in modern medicine: "This is the part of medicine that is so important that we don't talk about because… the more data and answers we have, we actually potentially increase the amount of uncertainty…We have to accept, 'I'm

not going to know everything, but I'm going to know what I need in the moment.'"

4 LIMITATIONS

This study has several limitations. First, we acknowledge that the findings are hypothesis-generating rather than definitive. We intentionally chose qualitative methods to explore this underexamined topic and to provide a foundation for future research. Future studies, therefore, might include larger, more diverse samples and mixed-methods or longitudinal designs to validate and expand upon these preliminary findings. In addition, our sample comprised experienced healthcare educators in a military-affiliated simulation, which may limit external validity. However, this military context provides unique insights, particularly relevant to medical education in high-acuity, uncertain, and resource-limited settings. Ultimately, our results should be viewed as contextually grounded and informative rather than generalizable, serving as a foundation for future research across broader educational and clinical environments.

We also acknowledge that voluntary participation may have introduced self-selection bias, potentially favoring participants with more positive attitudes toward or interest in uncertainty tolerance. Unfortunately, another limitation of our study is that we did not collect demographic information such as years of teaching experience or the level of learners taught. Finally, despite employing reflexive practices and consensus coding, researcher interpretation bias remains possible, as our professional backgrounds may have influenced theme development.

5 Discussion

In this qualitative study, we explored how experienced healthcare educators conceptualize and teach uncertainty tolerance and how their insights could inform educational strategies for health professions education. Four themes emerged: (1) confidence through exposure, (2) safety fosters engagement, (3) growth through insight, and (4) navigating ambiguity with flexible thinking. These findings suggest that uncertainty tolerance is a teachable, multifaceted competency that can be cultivated through experiential learning, psychological safety, reflective practice, and cognitive training.

Consistent with prior research, our participants described uncertainty as an inherent feature of medical practice and emphasized the need to equip learners with the mindset to manage it effectively.[5,6] In emergency medicine specifically, physicians routinely make rapid decisions with incomplete information and resource constraints.[1,15] The participants in our study emphasized early and repeated exposure to these types of high-stakes, ambiguous situations as foundational to developing confidence. Ultimately, this perception aligns with experiential learning theory, which emphasizes the role of concrete experiences and reflection for skill acquisition and professional development.[9]

Our findings also align with adaptive expertise theory, which distinguishes between 2 types of expertise: (1) routine expertise, being efficient in familiar situations, and (2) adaptive expertise, being able to apply knowledge flexibly in new or complex cases.[16,17] Our participants highlighted the importance of repeated practice and flexible thinking within high-stress, uncertain environments. In this context, building uncertainty tolerance can help students develop adaptive clinical reasoning. Teaching learners to consider multiple possible diagnoses and avoid jumping to conclusions are key cognitive strategies that support safer, more thoughtful decision-making.[15,18]

In addition to this theory alignment, our results suggest the importance of psychological safety in helping learners manage uncertainty. The participants in our study explained that students are more likely to engage with uncertainty when they feel supported and accepted by their teams and training environments. This theory aligns with existing research showing that team performance, resilience, and openness about errors all depend on environments where vulnerability is encouraged and where mistakes are viewed as learning opportunities.[19,20] Medical educators might promote this kind of safety by modeling uncertainty tolerance themselves, normalizing "not knowing" as part of medical practice, and intentionally creating spaces where learners feel comfortable taking risks, showing vulnerability, and asking questions.

Cognitive flexibility was likewise identified as a key skill for managing uncertainty. Our participants noted the importance of teaching students to avoid anchoring on a single diagnosis and instead to thoughtfully consider a broader range of possibilities. This approach aligns with dual process theory, which describes 2 types of thinking: fast, intuitive, and potentially unconscious decisions (system 1) and slower, more deliberate analytical reasoning (system 2).[21] Helping students learn how to shift between these 2 modes of thinking, whereas under stress can reduce common reasoning errors and build greater comfort with ambiguity.

Our participants also emphasized that emotional responses to uncertainty must be addressed directly so that learners do not confuse uncertainty with incompetence or failure, which might lead to anxiety, decision paralysis, and burnout. Interestingly, philosophical frameworks such as Stoicism and techniques from cognitive-behavioral theory were inherently invoked by participants as helpful for reframing uncertainty as an inevitable part of clinical practice. For example, Stoicism encourages focusing only on what is within one's control and accepting external events, which may help learners tolerate ambiguity without becoming emotionally overwhelmed.[22] Similarly, cognitive-behavioral strategies such as cognitive reframing and self-talk might help learners recognize and challenge unhelpful thoughts, like "not knowing means I'm not competent," and replace them with more adaptive beliefs that support resilience and effective decision-making under pressure.[23]

Beyond individual skill development, our findings suggest system-level implications for academic emergency

departments. Embedding structured opportunities to explore uncertainty, such as ambiguity-focused simulation, reflective debriefing, and "diagnostic uncertainty rounds," may reinforce key metacognitive skills. At the same time, faculty development is needed to ensure educators can model and teach uncertainty tolerance effectively. This professional development is especially urgent given evidence that faculty themselves may vary widely in their comfort with ambiguity.[1]

From a competency-based medical education perspective, as the field of medicine becomes more complex, the ability to navigate uncertainty emerges as a core professional competency. Emergency medicine, with its inherent unpredictability and time-pressured decision-making, is uniquely positioned to lead in this domain. We urge deans, program directors, clerkship leaders, and clinical educators to prioritize uncertainty tolerance in curriculum design, faculty development, and assessment. Doing so may not only improve patient care but also strengthen the resilience and well-being of the healthcare workforce.

In summary, despite its commonality in medical settings, uncertainty remains underemphasized in health profession education. This qualitative study identified educator-reported strategies and perspectives on fostering uncertainty tolerance that may inform the design of future educational curricula. These findings are exploratory and intended to serve as a foundation for further research to empirically examine how such approaches influence clinical reasoning, patient care, and clinician well-being.

AUTHOR CONTRIBUTIONS

RC and AFH conceived the study and designed the interview and selection materials. Data collection was conducted by RC and AFH. Qualitative data analysis was performed by RC, SK, and AFH. RC, AFH, and EP drafted the manuscript. All authors reviewed and approved the final manuscript. ChatGPT was used to copyedit this manuscript.

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CONFLICT OF INTEREST

All authors have affirmed they have no conflicting interests to declare.

DISCLAIMER

The opinions and assertions expressed herein are those of the authors and do not reflect the official policy or position of the Uniformed Services University of the Health Sciences, the United States Army, or the Department of Defense.

DATA SHARING STATEMENT

The deidentified datasets for this investigation are available upon request from the data article publication by contacting Rebekah Cole at rebekah.cole@usuhs.edu.

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SUPPLEMENTAL MATERIAL

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