

Warning bells

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CLINICAL REASONING

Warning bells: How clinicians leverage their discomfort to manage moments of uncertainty

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Abstract

Objectives: It remains unclear how medical educators can more effectively bridge the gap between trainees' intolerance of uncertainty and the tolerance that experienced physicians demonstrate in practice. Exploring how experienced clinicians experience, appraise and respond to discomfort arising from uncertainty could provide new insights regarding the kinds of behaviours we are trying to help trainees achieve.

Methods: We used a constructivist grounded theory approach to explore how emergency medicine faculty experienced, managed and responded to discomfort in settings of uncertainty. Using a critical incident technique, we asked participants to describe case-based experiences of uncertainty immediately following a clinical shift. We used probing questions to explore cognitive, emotional and somatic manifestations of discomfort, how participants had appraised and responded to these cues, and how they had used available resources to act in these moments of uncertainty. Two investigators coded the data line by line using constant comparative analysis and organised transcripts into focused codes. The entire research team discussed relationships between codes and categories, and developed a conceptual framework that reflected the possible relationships between themes.

Results: Participants identified varying levels of discomfort in their case descriptions. They described multiple cues alerting them to problems that were evolving in unexpected ways or problems with aspects of management that were beyond their abilities. Discomfort served as a trigger for participants to monitor a situation with greater attention and to proceed more intentionally. It also served as a prompt for participants to think deliberately about the types of human and material resources they might call upon strategically to manage these uncertain situations.

Conclusions: Discomfort served as a dynamic means to manage and respond to uncertainty. To be 'tolerant' of uncertainty thus requires clinicians to embrace discomfort as a powerful tool with which to grapple with the complex problems pervasive in clinical practice.

1 | INTRODUCTION

Physicians frequently experience uncertainty in the patient presentations they face,¹⁻³ and the ability to manage these 'ill-defined problems'⁴ effectively is a hallmark of expert practice.^{5,6} Problem solving in these spaces requires a more nuanced approach than collecting the right data, finding the diagnosis, and then initiating the appropriate, clearly defined treatment.⁷ Instead, clinicians must engage in a flexible and iterative process of refining and redefining their understanding of the problem, even as they are managing it.⁸ In the educational domain, concerns have been raised regarding learners' ability or willingness to tolerate the uncertainty associated with these ill-defined problems of clinical practice.⁹⁻¹¹ Yet, it remains unclear how medical educators might more effectively bridge this gap between trainees' intolerance of uncertainty and the tolerance that experienced physicians demonstrate in practice.

One approach to addressing this issue has been to explore clinicians' predispositions towards uncertainty. Taking this approach, researchers have utilised questionnaire-based tools to determine participants' affective reactions and coping mechanisms in response to a variety of scenarios, and to generate a "tolerance of uncertainty" profile for the individual.¹²⁻¹⁶ This investigative approach would suggest that the first step towards improving learners' responses to uncertainty would be to identify "maladaptive phenotypes"¹¹ or perhaps to identify an individual's particular maladaptive "cognitive, emotional and behavioural" responses¹⁷ that are triggered by experiences of uncertainty.

An alternative approach has been to explore how clinicians navigate ill-defined problems in context, expecting that individuals' idiosyncratic reactions to uncertainty will be determined in part by highly contextualised situational factors.¹⁸⁻²⁰ For example, work involving intraoperative observations and reflections of surgeons has elaborated the ways in which expert surgeons 'slow down' to think deliberately through complex situations, adapt their plans in response to contextual clues, and purposefully seek advice from colleagues.^{21,22} These types of investigations provide insights for the kinds of approaches and behaviours that might be reinforced in trainees to enable them to effectively navigate uncertain moments specific to their practice and, in this way, help them to engage effectively with uncertainty.

Pursuing this second approach to the study of uncertainty, we have explored the concept of 'comfort' as a starting point from which to understand how clinicians navigate experiences of uncertainty in practice.^{5,23} In this work, we described clinicians' experiences of uncertainty as arising from two sources ('What is going on?' and 'What should I do?') and conceptualised comfort as represented by one's confidence in one's ability to manage a situation safely and effectively in these uncertain moments. Reflections from practising clinicians suggested that they engaged in an appraisal of cognitive, behavioural and emotional cues gathered from patients, themselves and the situation to generate a continuous spectrum of comfort and discomfort during experiences of uncertainty.²³ Although discomfort was not the original focus of the work, it became apparent that participants were

Key message

Discomfort arising from uncertainty triggered clinicians to monitor situations attentively, to proceed intentionally, and to anticipate resources they might use strategically to manage uncertain situations.

expressing discomfort as a sense of *tentativeness*, an appraisal that particular uncertain situations *might* 'spin out of control', evolving in ways that were beyond their abilities to manage safely and effectively. This led us to consider a distinction between this sense of discomfort and the more commonly described notion of distress,²⁴ which has been defined as a state that arises from a clear determination that one's ability or resources are insufficient to manage a situation.

Although it was clear in our previous analysis that this sense of tentativeness did not preclude these clinicians from engaging with these thorny clinical problems, we did not explicitly examine the ways in which our participants noticed and responded to discomfort arising from uncertainty. In this paper, therefore, we return to the transcripts of the previous study to explore clinicians' responses to discomfort in settings of uncertainty. We used clinicians' perceptions of these moments to probe how these experiences were manifest cognitively, emotionally and behaviourally, and to explore how clinicians leveraged their discomfort to ensure the provision of effective patient care despite the inherent uncertainty they were experiencing.

2 | METHODS

This work is part of a larger programme of research around how clinicians experience the phenomenon of 'comfort with uncertainty' in practice^{5,23} and is importantly distinct from past work in that our focus here is to explore how clinicians experience, manage and respond to *discomfort* in settings of uncertainty. We conducted this study using a constructivist grounded theory (CGT) approach,²⁵ a qualitative methodology that uses inductive reasoning to build theory around data generated from complex cognitive and social processes.²⁶ Because CGT places value on the subjectivity of investigators as they interact with participants and make meaning from participants' narratives, it is important to note that three study team members are physicians in different clinical fields (JSI in emergency medicine, PWT in obstetrics and gynaecology, and JLB in internal medicine), two team members have advanced training in cognitive psychology (AdB and GR), and three team members have expertise in qualitative research methods (PWT, JLB and GR).

2.1 | Setting, population and sampling strategy

Because we were interested in exploring how physicians iteratively manage and respond to moments of discomfort, we

hypothesised that clinical work in the emergency department would provide frequent experiences around our phenomenon of interest. Clinicians working in this setting care for patients with a wide variety of complaints and acuity, and make management decisions with limited information about what might be causing patients' symptoms and how these disease processes might respond to initial treatments. We purposefully sampled amongst a cohort of emergency medicine physicians with a spectrum of experience in practice, who worked at two resource-rich, urban teaching hospitals, because we were interested to see how clinicians used consultative and material resources to manage moments in which the clinical problems they faced were at the borders of their idiosyncratic skills and past experiences. Importantly, the principal investigator (JSI) is a faculty member in the same academic department as these participants and thus was familiar their backgrounds and practice context. Participants were enrolled through targeted emails emphasising that their participation was voluntary and that their narratives would be anonymised. This investigation was reviewed by the Human Subjects Division at the University of Washington and deemed to meet exempt status.

2.2 | Procedures

The principal investigator conducted hour-long semi-structured interviews with participants over a 4-month period (December 2018 to April 2019) using a critical incident technique²⁷ to explore their experiences immediately after they finished their clinical shifts. Following a brief introduction to the study purposes, participants were asked to engage in approximately 10 minutes of independent reflection while drawing two pictures: the first concerning a case from their preceding shift that had 'made them sweat' (eg, had aspects that had made them feel anxious or concerned), and a second regarding a case that they had felt able to handle without the assistance of other physicians. After asking the participants to describe their drawings, we used probing questions to explore their experiences of discomfort in these moments, elaborating the cognitive, emotional and somatic cues they had identified during these experiences, how they had managed and responded to these cues, and how they had used resources available to them to act in these moments of uncertainty. We subsequently used a similar set of questions to explore additional cases from their preceding clinical shift that had generated various levels of uncertainty and discomfort. In the tradition of CGT, we specifically sought cases that offered the opportunity to enrich and expand, or challenge and disconfirm, our evolving conceptual framework. Interviews were audiorecorded and transcribed for analysis, and constant comparative analysis²⁸ was used to develop, refine and scrutinise emerging theories. We made changes to our interview guide iteratively to enable theoretical sampling of the categories and themes that emerged from the data.

2.3 | Analysis

Our analysis focused on the transcripts of the interviews rather than on the pictures the participants drew. Although the drawings were valuable for priming reflections, they were sufficiently sparse that we deemed treating them as a separate data source unreasonable. Two investigators (JSI, JLB) used Dedoose (SocioCultural Research Consultants, Manhattan Beach, CA, USA) to code transcript data line by line and to organise data into focused codes, key conceptual categories and major themes. Using constant comparison, these analyses were conducted concurrently with data collection. The entire team met regularly to discuss axial and selective coding, identifying relationships between codes and categories, and developing a conceptual framework that reflected possible relationships between themes. The principal investigator conducted a total of 12 interviews. After 10 interviews, the subsequent two interviews yielded no additional insights or counter-examples. At that point, we felt that our sample was sufficient for the study purpose.²⁹

3 | RESULTS

We enrolled 12 emergency medicine faculty with a spectrum of clinical experience (2-32 years in practice), who discussed between three and seven cases per interview, for a total of 55 unique clinical cases in the final dataset. Participants identified elements of discomfort as part of each of these case descriptions and often linked these appraisals of discomfort to cues that had alerted them to a problem that was evolving in unexpected ways or the possibility that the problem *might* evolve beyond their ability to manage it. In some cases, our participants' descriptions of discomfort were linked to specific risks they had been thinking about, from identifying discordant data, to imagining the potential complications of specific illnesses they had been considering, to self-assessing their own skills. In other cases, their discomfort was cued by vague somatic or emotional signals that something was awry, such as:

[...a] feeling of noticing that maybe somebody's following you down the street... that something doesn't feel 100% safe here or 100% right here.

(Participant 1)

Discomfort served as a trigger for two over-arching themes of responses. Firstly, participants seemed to invest greater cognitive resources into these moments, monitoring with greater attention, moving forward with more intentionality, and thinking deliberately about the resources they might call upon. Secondly, participants used their discomfort as a trigger for invoking resources—*human* resources in particular—on which to lean as a way to strategically manage these situations. These themes are discussed in greater detail below.

3.1 | Discomfort as a trigger for attention and intention

Our participants' narratives included numerous descriptions of how noting discomfort prompted them to respond in the moment with greater attention and intention. This manifested in the form of the approaches they used to understand a situation and to prioritise emergent tasks, as well as the ways in which they strategically considered resources in their environment that they could call upon in their efforts to deliver safe and effective care. These sub-themes are discussed below.

3.1.1 | Perking up

Participants described how their sense of discomfort prompted them to focus their attention on the problem(s) at hand. There was a sense that participants heightened their degree of monitoring during these moments of discomfort, bringing their cognitive resources to bear on a situation in more purposeful ways. One interviewee described this experience of 'perking up' when caring for a patient whose clinical evolution proceeded in unexpected ways:

Definitely [the low blood pressure] made me more nervous. A patient who supposedly had been resuscitated and had had an intervention completed that should have worked, but now is showing signs of instability... It made me wanna make sure that I'm really paying attention to all the parameters and making sure everything's taken care of.

(Participant 8)

3.1.2 | Stepping back

In directing their attention towards problems that were generating discomfort, participants also seemed to engage in more deliberate problem-solving activities. For example, they drew on well-established algorithms to invoke more strategic and deliberate approaches to information gathering. Using these 'tried and tested' approaches seemed to serve as a calming ritual for participants, enabling them to weather the emotional cues they were noticing in these moments. This, in turn, seemed to enable them to 'step back' and redefine the situation in new ways. One participant described this process in the context of a patient who had sustained major trauma:

That happens classically... when you get a sick trauma patient, and a whole lot of things are going on and multiple things come in that are unexpected and it throws you off. And sometimes you get like, 'F#*k, I'm in the forest! I've got to get out of this forest!' right? And the anxiety can kill you... you buckle... In my limited experience I just go back to my ABCs

[airway, breathing, circulation], go back to my primary and secondary survey, restart over then. Sometimes you just have to—like the computer—just unplug the power and plug it back in... Sometimes you've just got to say, 'Okay, I've got to start fresh here.'

(Participant 2)

3.1.3 | Ensuring that necessary resources are in place

Participants' increased intentionality in thinking about the situation also involved a deliberate consideration of downstream clinical events that might pose risk(s) to their patients, and an associated consideration of the kinds of resources they might need to deal with these situations (both equipment and people). Participants drew frequent linkages between hypothesised risks and the management tools available to them. Some material resources were known entities in these clinicians' work environments (eg, they knew the typical locations of code carts), and this seemed to provide an implicit sense of comfort that those types of resources could be accessed quickly and easily. By contrast, when participants talked about rarely performed procedures, they described having to more explicitly consider what they might need to put in place and *how* to access the necessary equipment. Interestingly, this created additional forms of uncertainty that added to, rather than reduced, their sense of discomfort. One clinician described this sense of increased discomfort as she thought through how to manage a patient with cirrhosis who presented with a massive upper gastrointestinal haemorrhage:

When I saw him start vomiting blood, I thought about a Minnesota tube, which I haven't placed in years and certainly didn't know where one was. I was immediately thinking worst-case scenario, like 'what if?' and... that isn't something you think about much and [it] definitely raises your stress level.

(Participant 7)

Participants also described the ways in which they viewed other health care professionals as resources when thinking through diagnostic and management plans that generated discomfort. They described judgements about the abilities of their emergency department team members, such as 'I knew that I was working with a resident that I felt that I could trust' (Participant 3), as well as whether they had faith in the expertise of consultants from other services. When participants sensed that others would be available to help them tackle a challenging situation effectively, this seemed to mitigate some of their discomfort; the opposite was true when they sensed that their consultative resources were also struggling in the situation. This was particularly evident in our participants' work context when they depended on consultant trainees to act as surrogates for expert supervisors who were providing guidance remotely by telephone. For example, while listening to one end

of a telephone consultation, this interviewee had concerns that a resident consultant was not adequately describing the nuances of a situation to an attending physician, and this generated discomfort about the time-sensitive, high-risk treatment that was being considered:

It's not clear if [the resident] is adequately and completely explaining everything [to the attending physician]. And I had no knowledge of what the other half of the conversation was... That causes some anxiety, but more like frustration that it feels like it's slowing the process down and injecting uncertainty into, like, how to move forward here.

(Participant 4)

3.2 | Discomfort as a trigger for leaning on others

In many instances, participants' discomfort triggered them to actively engage the help of colleagues both within and outside the emergency department. In some instances, participants used these consultations as a means to 'check' whether their diagnostic or management plans were aligned with how others would approach the same problem (in a way we have termed 'borrowing comfort'). At other times, they drew from their discomfort to signpost instances when they needed others' input, that is when they needed to 'hand over' problems, or specific aspects of problems, to colleagues.

3.2.1 | Borrowing comfort

There were times when participants struggled to prioritise their own hypotheses about the ways a problem might be interpreted or the multiple management approaches they might take. To enact a plan with greater confidence, they 'borrowed comfort' from others by checking whether their reasoning and management approaches were aligned with how others would think about the problem. Getting reassurance from physician colleagues or from other members of their emergency department team (eg, nurses, social workers) in this fashion seemed to proactively buoy participants' feelings of comfort that their approaches were defensible in the eyes of others, particularly if risks they were thinking about came to fruition as a problem progressed. This participant described how discussions with colleagues informed the difficult decision to restrain a patient with decompensated mental illness:

I think I needed to hear from other people that this was okay... I wanted somebody to reassure [me]... I don't necessarily want all the responsibility for this decision. And it is ultimately my decision. I'm responsible. But, I don't know, I just wanted us as a team to own this plan of care.

(Participant 1)

3.2.2 | Handing over

In other situations, participants interpreted their discomfort as signalling that problems were progressing in ways they could no longer handle independently. They responded to these instances by 'handing over' part of a problem, or the problem in its entirety, relinquishing control of diagnostic and management decisions to others with expertise around the issue that was generating discomfort. Sometimes this involved targeted consultations with colleagues around a specific aspect of a case with which they needed help; when asking for help in these instances, participants continued to manage the *other* aspects of the case that they felt they could handle without assistance. An example of seeking guidance in this focused way was illustrated in an anecdote by Participant 6, who sought help from a haematologist to manage an instance of blast crisis (markedly elevated white blood cell counts beyond the normal values of approximately 8000-10 000) in chronic myelogenous leukaemia while continuing to manage the other aspects of care for a critically ill patient:

I would say I don't think I know how to handle or treat blast crisis off the cuff... so I recruit[ed] the help of the haematologists...[The patient] had many things going on because he also may have been septic, he was also extremely dehydrated. That would need to be sorted, and that part I can handle. I don't usually treat white cell counts of 600 [thousand] by myself. I don't consider that in the realm of [the] ER [emergency room].

(Participant 6)

In other cases, participants described reaching points at which they could not think of any further ways to differentiate the problem(s) or identify treatments they felt would be safe and effective. They therefore handed the care of these cases over to colleagues with different training or resources (eg, hospitalists, intensivists, specialists). In handing over these cases, participants often articulated their ongoing sense of discomfort to others, as this interviewee described during his telephone conversation with a colleague who was admitting a critically ill patient to hospital:

I have no path. I'm staring over this cliff of my own experience into the great wide unknown. I've got nothing else [I can] do. I need you to show up so that we can either jump off this together or you build me a bridge of some sorts to wherever we're going to go next.

(Participant 5)

In asking for help in these ways, participants emphasised the importance of working through problems to a point at which they could ask for specific guidance or assistance from their colleagues. This helped them to guide others towards the specific aspects of a problem for which they were seeking support:

Our job is to help consultants help us help our patients... [it is] how you point them so that they can provide the answer to the question that you're asking.

(Participant 10)

3.3 | White-knuckling

Finally, it is worth noting that participants described rare instances in which they experienced strong feelings of discomfort regarding high-risk problems that they would typically have handed over, but where help was not available. Lacking this help, they 'white-knuckled' their way through these challenging situations, taking action despite sensing that a problem was at the borders, or outside, of their expertise. These moments typically took place in the context of rapidly evolving situations that required clinicians to intervene quickly to address problems that posed imminent risk to the patient. One participant described this experience of being called into action to perform a surgical airway—a rare event, and one he had performed only once previously—and the challenges of performing well under these circumstances:

In the ER we're asked to do things we rarely do... And we have to. That's part of emergency medicine. We have to do that. There's not any way around that...I thought, 'I've got to get it in, and I've got to get a tube in this guy. He's going to lose his brain. He's going to get hypoxic and lose his brain.' So I felt like the clock was ticking and... then when I went for it, I felt I had to be fast.

(Participant 2)

4 | DISCUSSION

These results suggest that discomfort may be more central to how physicians manage uncertain clinical experiences than current conceptualisations would imply. Our participants reflected on their discomfort in deliberate ways, describing specific risks they were thinking about at that instant or risks they felt to be sufficiently possible in the future. They also experienced somatic or emotional signals such as fear or apprehension that alerted them to the possibility that clinical problems were evolving in ways that were either risky or that took them to the borders of their expertise. By noticing their discomfort, our participants seemed able to use it as a signal that indicated they needed to pay greater attention, think through problems more deliberately, or brainstorm how they might use resources in their environment to ensure safe, high-quality care. Thus, they were able to 'manage' experiences of uncertainty by monitoring the evolving balance between discomfort and comfort during these moments, continually revisiting and revising their sense of whether their management approaches were working. When discomfort

persisted and was appraised to be significant, they pivoted towards new approaches or strategically engaged the help of others.

These findings add to our evolving understanding of discomfort as an important phenomenon in clinical reasoning. Our results suggest that discomfort exists as a liminal state,³⁰ an awareness that the problem one is facing is not straightforwardly predictable or manageable. It therefore reflects a sense of 'tentativeness' in settings of uncertainty, triggering clinicians to consider that events *might* evolve in ways that would challenge their capacity to manage safely and effectively. We see this as distinct from the clearly negative state of 'distress',²⁴ which represents a strong emotional or somatic response to an explicit *recognition* that the situation is beyond one's capacity to manage but nonetheless is still one's responsibility to manage (ie, 'white-knuckling'). This distinction has led us to more fully appreciate the binary construction of the 'eustress' and 'distress' paradigm, which implies a certainty about whether one can rise to the challenge of an uncertain situation.²⁴ Thus, we see discomfort as analogous to a quantum state between eustress and distress, in which there is heightened awareness and recognition that a problem has elements of unpredictability that may lead to a situation that exceeds one's capacity to manage with control and confidence given the resources available in that moment.

The ways in which our participants marshalled additional cognitive resources and proceeded with intentionality around problems generating discomfort aligns with past descriptions of how expert surgeons navigate moments of intraoperative uncertainty. Previous studies have elaborated the notion of 'slowing down when you should' as a description of how expert surgeons shift from automatic to more effortful reasoning when they encounter intraoperative complexity.^{22,31,32} Our participants' responses to uncertainty are also reminiscent of what Cristancho and colleagues noted in their observations of expert surgeons who were experiencing intraoperative uncertainty, namely that they actively sought and transformed information into new meaning,³³ considered risks and alternative approaches, re-evaluated and adapted their plans, and sought advice from colleagues when their initial approaches did not seem to improve a situation.²¹ Importantly, our work advances our understanding of how clinicians respond to uncertainty by identifying perceptions of discomfort as triggers that clinicians use to question and reconsider their understanding of and approaches to a situation, to think deliberately about moments at which they might get in over their heads, and to strategise how they might enact available resources effectively. Thus, monitoring for and explicating the sources of clinicians' discomfort offer novel means by which investigators can study how clinicians work through ill-defined problems.

These results highlight the importance of investigating physicians' work with ill-defined problems³ in situ. Clinicians in our study described approaches that were exploratory, guided by ever-changing metacognitive judgements, and sensitive to the resources (both material and human) that were inherent to their work environment. This stands in stark contrast to traditional problem-solving approaches in which solitary clinicians employ Bayesian frameworks to estimate probabilities for well-defined problems with knowable solutions.³ These results instead emphasise the iterative, situated nature of reasoning in

practice,³⁴ particularly how knowledge and expertise are distributed between clinicians³⁵ and the strategic ways in which clinicians tackle complex problems using their knowledge of the resources available in their environments. This aligns with work demonstrating that obstetricians considered organisational affordances when navigating uncertainty around their management of labour in patients who had previously undergone caesarean sections.³²

If discomfort is an important trigger for how experienced clinicians manage and respond to uncertainty, this also shifts our thinking about how we might more effectively design curricula to prepare trainees for these experiences in practice. Instead of striving to remediate or eliminate the problematic 'phenotypic' responses in trainees,¹¹ the focus would instead shift towards more intentional noticing of discomfort, explicating the root cause of this discomfort (when possible), and then leveraging that discomfort strategically in the moment. Further, we need to recognise the 'cognitive, emotional and behavioural' responses to uncertainty described by Hillen and colleagues¹⁷ as deeply situated cues that clinicians notice in these moments. That is, these responses may not be generic predispositions to uncertainty, but, rather, may serve as a means to inform more holistic appraisals in order for individuals to determine whether they can rise to the challenge in front of them. Helping trainees to more intentionally monitor and respond to these metacognitive experiences in the moment may thus be a useful way to prepare them for the idiosyncratic, ill-defined, contextually embedded experiences of uncertainty they are likely to encounter in practice.³⁶

Taken together, we believe that managing uncertainty entails recognising discomfort as a powerful tool, and that harnessing the cognitive, emotional and behavioural cues within the confines of a specific moment enables individuals to deliberately increase their attention and intentionality while working towards context-specific responses. Thinking about reasoning in this way also shifts teaching, learning and assessment practices towards the strategies that clinicians use when asking for help or handing over responsibility when they have persistent discomfort regarding 'what is going on' or 'what they should do'.²³

4.1 | Limitations

Our methodological decisions place limitations on our findings and interpretations. Firstly, and most importantly, the narratives from this study came from clinicians who work in two academic emergency departments that are rich in both consultative and material resources. The situated aspects of uncertainty and discomfort described here may thus not be transferrable to different practice settings or to learners with less experience. We would expect that clinicians' responses to discomfort would look quite different in more austere medical settings, and would also expect to see variations in responses within the same health care system (eg, if a patient with the same complaints presented at an out-patient clinic). Further, it is quite likely that novice clinicians experience very different sources of uncertainty, and we might expect them to respond to their discomfort in ways that are distinct from the

experiences described herein. Secondly, because we collected post hoc narratives from our participants, we recognise that these data may not fully capture the conscious, subconscious and situational influences that played into their in-the-moment experiences, and our design precludes any commentary on the quality of care that was delivered or the eventual clinical outcomes.^{34,37,38} Conducting these types of interviews in real time or coupling them with direct observations within a clinical environment would probably offer additional nuance to these phenomena. Finally, because we explored uncertainty and discomfort from the vantage point of emergency medicine physicians, our narratives reflect only one side of these resource-utilisation conversations. It thus remains unclear whether consultants had a shared understanding of *why* they were being involved in the care of these patients and their perspectives on the ways that they conceptualised their roles in these patient care interactions. If effective clinical reasoning is to be viewed as a shared responsibility within a system of care,^{39,40} it is important to explore the perspectives of team members from multiple health care professions and medical specialties as they engage concurrently around a particular patient's care.

5 | CONCLUSIONS

These limitations notwithstanding, this work represents an important step towards explicating the ways in which clinicians use their graded, ever-evolving sense of discomfort as a means of dynamically modulating their responses to uncertainty. As they face ill-defined problems at work, the extent to which clinicians are likely to 'tolerate' uncertainty thus has more to do with the strategies they use to address idiosyncratic and contextually embedded situations than generic predispositions towards uncertainty overall. To be 'tolerant' of uncertainty requires clinicians to embrace their discomfort as a tool that enables them to grapple with the complex situations they face in authentic clinical settings.

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CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTIONS

JSI made substantial contributions to the conception and design of the work, performed the primary analyses and interpretation of the qualitative dataset for the work, and drafted the paper. PWT and AdB made substantial contributions to the conception and design of the work, and contributed to the interpretations of the qualitative dataset. JLB made substantial contributions to the conception and design of the work, performed secondary analyses and contributed to the interpretations of the qualitative dataset. GR made substantial contributions to the conception and design of the work, and

contributed to the interpretations of the qualitative dataset and the drafting of the paper. All authors contributed to the critical revision of the work for important intellectual content and approved the final manuscript for submission. All authors have agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

ETHICAL APPROVAL

This investigation was reviewed by the Human Subjects Division at the University of Washington and deemed to meet exempt status.

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