

Brief overview of the A&E UT intervention literature

A search using Google Scholar with several variations on the terms 'uncertainty tolerance', 'risk tolerance', 'interventions', 'management' etc. was performed. The aim was to identify relevant literature on intervention strategies. Given a review was published in 2018 [1], a limit was set from 2018 to 2021.

Just two recently published attempts at characterising potential uncertainty-related intervention targets amongst emergency doctors specifically were found [2-3], along with an ongoing related project [4]. There was also another project that assessed how very junior emergency doctors navigate uncertainty, which may have important implications for uncertainty-focused interventions targeted at junior staff [5]. A very brief overview of these studies follows, but a more detailed overview can be seen in Table 1 below.

Ilgen et al. (2021a) [3], suggest that there are two approaches to investigating potential uncertainty-tolerance-related interventions targets: using questionnaires and other methods to determine '*maladaptive phenotypes*' (i.e. investigating how doctors who lack uncertainty tolerance react to uncertainty (as in [2]), and attempting to modify those reactions), or exploring how doctors navigate uncertainty situations 'on-line' (i.e. deducing what behaviours or approaches should(n't) be supported, by monitoring behaviour in context) (as in Ilgen et al. 2021a). It is arguable, however, that this is a false distinction; 'reaction' models can be used to analyse uncertainty reactions at both the trait and state level - as in Hillen et al. (2017) [6]: '*...our conceptual model of UT also enables the phenomenon to be approached as either a personality trait **or** a state contingent on context and situation... [the latter to] better understand contextual factors that influence UT and to develop interventions to influence these factors.*'

Among emergency doctors, Ilgen et al. (2021a) [3] found that clinical uncertainty triggers a feeling of 'discomfort', which in turn triggers two types of responses: cognitive (greater self-monitoring, attention, reflection) and human resource seeking (e.g. colleagues' advice). The implication being, therefore, that interventions (not elaborated upon in the paper) may be used to bolster the efficacy of the responses (e.g. perhaps a mindfulness-based intervention could improve self-monitoring). Han et al. (2021) [2] suggest that there are four broad ways of increasing tolerance, focusing on: 1. ignorance i.e. using strategies directed at reducing medical

uncertainty by decreasing the root cause: ignorance, 2. uncertainty i.e. using strategies directed at reducing uncertainty via the conscious awareness of the ignorance, 3. 'responses' i.e. using strategies directed not at eliminating uncertainty but at mitigating its negative psychological effects, and 4. relationships i.e. using strategies directed not at eliminating uncertainty but at mitigating its negative psychological effects via social relationships (Figure 1). Lastly, among other findings, Parker et al. (ongoing) [4] found that quick feedback on emergency doctors' decisions may speed up the process of the ability to make probability assessments, allowing risks to be taken where appropriate (which previous research has attributed to experience).

It is important to note also that all these studies have implications for medical education, which was found to be unrealistically focused on a 'quest for certainty' [4] - perhaps causing junior doctors to feel overwhelmed and with self-doubt in uncertain situations. A growing body of opinion suggests that curricula aiming to promote acceptance of uncertainty may have positive psychological outcomes on doctors [1]. Nevertheless, while these studies do provide directions about where interventions may be useful (in terms of targets or focus), they only investigated strategies that doctors *already used*. As a result, they provide little insight about what and how strategies could effectively be translated into interventions. The authors also did not investigate what potential interventions to modify uncertainty would look like in terms of format, modality, and duration, and suggest that there are many more strategies that they probably missed. Further, their findings need to be corroborated, particularly before the three USA-based studies [2-3, 5] findings are generalised to the UK context.

With the above limitations in mind, studies should seek to investigate potential strategies which could support doctors in managing their uncertainty, and what an intervention to mitigate uncertainty would 'look like' - with a key focus on feasibility and acceptability. It would be interesting also to assess how interventions may be delivered in practice from an implementation perspective, and to assess how curricula may be modified to ingrain UT in junior doctors.

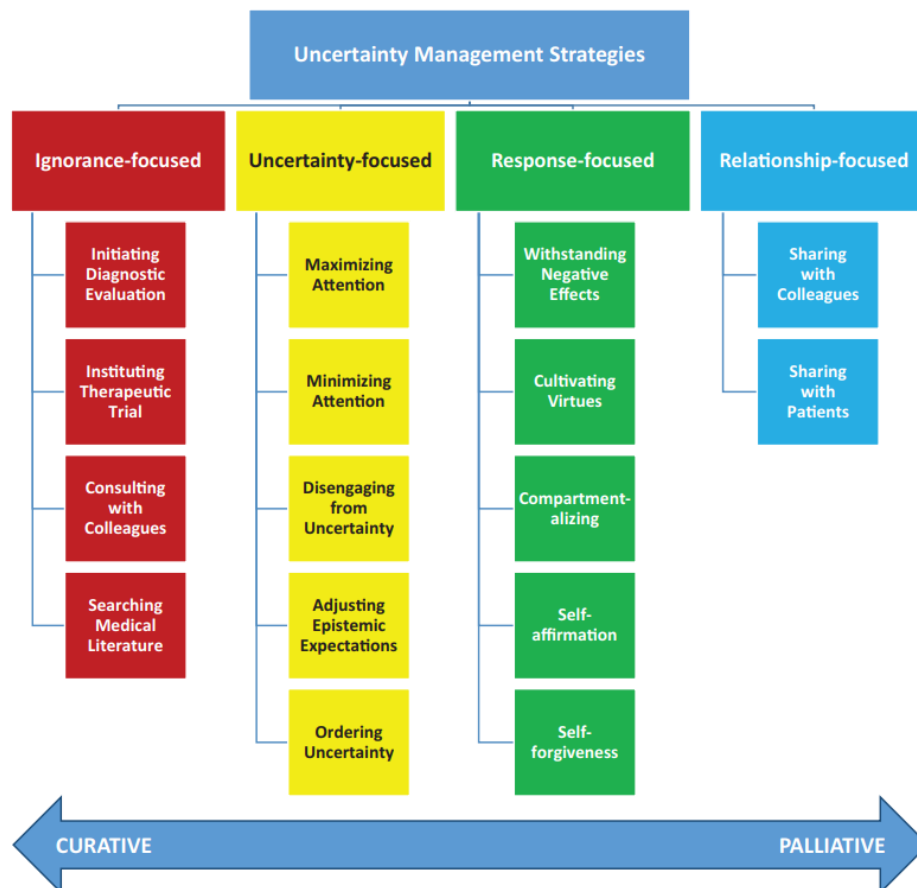


Figure 1. Han et al. (2021) taxonomy of uncertainty management strategies.

Table 1. Qualitative research aiming to identify how doctor manage uncertainty.

Paper	Aims	Method/sample	Findings (themes)	Limitations	Recommendations
Han et al. (2021) [USA]	<ul style="list-style-type: none"> - Describe strategies doctors use to manage uncertainties - Develop a conceptual taxonomy of strategies for managing medical uncertainty 	<ul style="list-style-type: none"> - 22 interviews (30-45 minutes) - Inductive, grounded theory approach - 9 emergency doctors, 13 others, from one hospital - Mostly males (64%) with a wide range of clinical grades 	<p>Strategies for managing uncertainties were classified within 4 conceptual categories corresponding to their primary focus or target:</p> <p>Ignorance-focused (reducing medical uncertainty by decreasing 'ignorance'). Strategies: searching the literature, consulting with colleagues, instituting therapeutic trials (i.e. trial and error) and initiating diagnostic evaluation (e.g. order more tests)</p> <p>Uncertainty-focused (directed at reducing uncertainty via the conscious awareness of the ignorance). Strategies: maximising attention to one's ignorance (counterbalanced via minimising attention - ignoring one's ignorance), disengaging from uncertainty (emotional distancing, or transferring responsibility of dealing with uncertainty to others), adjusting epistemic expectations (acknowledging the complexity of medicine), ordering uncertainty (managing it logically e.g. by risk-benefit analysis, or following a clinical pathway)</p> <p>Response-focused (directed at mitigating negative psychological effects of uncertainty). Strategies: withstanding negative effects (enduring the 'feeling of angst'), cultivating virtues (ensuring a thorough job is conducted despite uncertainty), compartmentalising (isolating and uncoupling cognitive/emotional/behavioural responses to uncertainty), self-affirmation (acknowledgment that one's strengths exceeds their limitations as a clinician), self-forgiveness (absolving self from blame + care less about negative evaluations from others)</p> <p>Relationship-focused (directed at mitigating the negative psychological effects of uncertainty via social relationships - including colleagues/patients). Strategies: sharing with colleagues and sharing with patients (e.g. giving patients some investment in decisions)</p> <p>Participants described a temporal evolution in their management of uncertainty, which they attributed to the development of four key capacities:</p> <p>Epistemic maturity. A temporal shift in one's ability to appraise knowledge from a naïve stance (dichotomous right/wrong) to a mature stance (acknowledging knowledge as pluralistic, relative, provisional)</p> <p>Humility. Experience leads to both confidence and humble acknowledgement of the limitations of medical knowledge. Humility was related to willingness to seek help, openness and emotional uncertainty tolerance.</p>	<ul style="list-style-type: none"> - Small, homogeneous, one-site convenience sample - May not generalise to other specialties - Does not address unconscious strategies 	<ul style="list-style-type: none"> - Identify additional strategies to build on and refine the taxonomy - Enhance or support identified existing uncertainty management strategies - Evaluate taxonomy-informed interventions

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			<p>Flexibility. Experience leads to a shift ‘from the science to the art’; an openness to uncertainty due to its ability to promote creative, adaptive (perhaps more enjoyable) care.</p> <p>Openness. An acknowledgment of the positive aspects of uncertainty i.e. see it as an opportunity. Uncertainty leads to personal growth, optimism and meaningful engagement with colleagues/patients.</p>		
Ilgen et al. (2021a) [USA]	Evaluate the discomforting effects of clinical uncertainty on emergency doctors, and identify how they manage it	<ul style="list-style-type: none"> - 12 interviews (~1-hr) - Constructivist grounded theory approach - Ppts interviewed immediately post-shift, reflecting on cases that led to anxiety and the strategies they used to manage it - All emergency doctors from 2 hospitals with a wide range of clinical grades 	<p>Discomfort as a trigger for attention intention</p> <p>Perking up. Discomfort prompts focused attention on/heightened awareness of a problem</p> <p>Stepping back. Discomfort prompts problem-solving, including relying on established guidelines/methods or information gathering. This was calming and enabled doctors to redefine the situation</p> <p>Ensuring necessary resources are in place. Discomfort prompted planning for potential negative events. If a predicted event was considered manageable this was comforting. If it was not, this added to uncertainty and discomfort. When participants sensed that others would be available to help them, this mitigated some discomfort; the opposite was true when their consultative resources were also struggling (e.g. remote discussion via telephone to experts undermines nuances)</p> <p>Discomfort as a trigger for leaning on others</p> <p>Borrowing comfort. Discomfort prompted checking with others whether their reasoning about a problem was coherent. This gave them a sense that they had a ‘defence’ should risks manifest</p> <p>Handing over. Discomfort prompted thoughts that the situation was beyond their ability. Participants responded by transferring the case to others (partially/wholly) - relinquishing decisions</p>	<ul style="list-style-type: none"> - Just USA two hospitals - May not apply to ‘novices’ - Post-hoc reflections may preclude ‘in the moment’ thoughts 	Assess how interventions can leverage responses to discomfort
Ilgen et al. (2021b) [USA]	Explore how junior emergency doctors ‘work through’ uncertain clinical moments	<ul style="list-style-type: none"> - 13 interviews (~1hr) - Constructivist grounded theory approach - Ppts interviewed immediately post-shift, reflecting on cases that led to anxiety and the strategies they used to manage it 	<p>Uncertainty about their appraisals of the situation</p> <p>Participants had low self-confidence regarding patient management, reinforced by instances where others told them they missed important details. They also found it difficult to know when discomfort was due to their lack of ability, or case complexity. They thus struggled to identify whether they should trust their judgements and try to convince other clinicians that they were correct</p> <p>Difficulties with selecting, interpreting and using cues</p> <p>Given self-doubt, participants questioned whether the cues they used to inform their appraisals were legitimate – attempting to mitigate this by superfluous information-gathering strategies. Participants attributed this to lack of experience. To mitigate self-doubt, doctors used cues to</p>	<ul style="list-style-type: none"> - Interviewer was a faculty emergency medicine educator (potentially biasing responses) - Just 2 urban US hospitals - May not generalise to less junior doctors 	Participants’ struggle with the ‘legitimacy of their interpretations’ offers a potential intervention target to help trainees optimise their clinical judgments

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		- All emergency doctors from 2 hospitals, within 15 months of their postgraduate training	<p>appraise how comfortable they <i>should be</i> in addition to how they <i>were</i> (e.g. assessing whether other clinicians felt similarly about a case)</p> <p>Influences on their responses to the uncertainty of the situation To mitigate self-doubt, participants engaged in several strategies: <i>Mental rehearsals.</i> Prior to a shift or seeing patients, participants mentally rehearsed what patient factors they would investigate to establish diagnoses <i>Cross-checking.</i> They cross-checked their judgements in real time with others around them to build confidence <i>Drafting.</i> They monitored whether colleagues held positive appraisals of their performance</p>	- The study took place during COVID-19 pandemic which could have influenced generalisability	
Parker et al. (Ongoing) [UK]	Explore junior doctors experience of uncertainty to support development of an intervention to enhance UT	<p>- 14 interviews (25-57 mins)</p> <p>- Thematic analysis</p> <p>- All emergency doctors from 2 hospitals with a wide range of clinical grades</p>	<p>The evolution of uncertainty tolerance More experienced doctors make fewer attempts to reduce ambiguity before decision-making. Medical education was considered responsible; participants noted a lack of acknowledgment of the irreducibility of uncertainty in practice. <i>Learning on the job.</i> Medical education was felt to be unrealistically focused on a 'quest for certainty'. Junior staff therefore attempt to avoid uncertainty <i>Accepting the nature of the business.</i> With experience, practice becomes less about mitigating uncertainty and more about considering which risks to take. Experienced doctors considered uncertainty was driven by external factors (e.g. time) + acknowledged staff variation in decision-making styles is desirable <i>Increased utilisation of strategies.</i> Experienced doctors are more comfortable with certain uncertainty management strategies e.g. seeking advice. They also put more trust in patients to determine whether they need to return to hospital upon discharge <i>Cycle of uncertainty tolerance.</i> UT was considered flexible over time/change in circumstances, and influenced by clinical experience e.g. experiencing an adverse event may temporarily decrease UT though more exposure to events = increased UT. More responsibility/exposure to a unfamiliar department may temporally decrease UT</p> <p>An increase in uncertainty tolerance or a reduction in the uncertainty to tolerate? Temporal changes in experiencing uncertainty seem to be as related to <i>experiencing</i> less uncertainty as <i>tolerating</i> it. This is due to having more knowledge to inform clinical decisions and greater confidence</p>	<p>- Just one UK hospital</p> <p>- Did not include non-junior doctors</p> <p>- Study not yet completed</p>	<p>Explore doctors' preferences with regard to modality and targets of UT interventions</p> <p>(initial methods: training, feedback, clear role allocation, rota planning, gradual increase in decision-making role)</p>

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			<p>Knowledge informing practice. Exposure to more instances of being right/wrong + patient variation led to less uncertainty and less perceived complexity, as medical knowledge/expertise increased.</p> <p>Confidence in clinical judgement. Experience led to more confidence and trust in 'gut instinct'. This was supported where doctors had received no complaints, confirmation of clinical judgment in tests, and praise from colleagues</p>		

References

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