Education and training

Resident uncertainty in clinical decision making and impact on patient care: a qualitative study

J M Farnan,1 J K Johnson,1 D O Meltzer,1,2 H J Humphrey,3 V M Arora1,3

ABSTRACT

Background: Little is known regarding how internal medicine residents manage uncertainty during decision making and subsequent effects on patient care. The aims of this study were to describe types of uncertainty faced by residents, strategies employed to manage uncertainty and effects on patient care.

Methods: Using critical incident technique, residents were asked to recall important clinical decisions during a recent call night, with probes to identify decisions made during uncertainty. They were also asked to report who they approached for advice. Three authors independently coded transcripts using the constant comparative method.

Results: The 42/50 (84%) interviewed residents reported 18 discrete critical incidents. Six categories emerged and mapped to the domains of the Beresford Model of Clinical Uncertainty: technical uncertainty (procedural skills, knowledge of indications); conceptual uncertainty (care transitions, diagnostic decision making and management conflict) and personal uncertainty (goals of care). In managing uncertainty, residents report a “hierarchy of assistance”, using colleagues and literature for initial management, followed by senior residents, specialty fellows and, finally, the attending physician. Barriers to seeking the attending physician’s input included the existence of a defined hierarchy for assistance and fears of losing autonomy, revealing knowledge gaps, and “being a bother”. For 12 of the 18 cases reported, patient care was compromised: delay in procedure or escalation of care (n = 8); procedural complications (n = 2); and cardiac arrest (n = 2).

Conclusion: Resident uncertainty results in delays of indicated care and, in some cases, patient harm. Despite the presence of a supervisory figure, residents adhere to a hierarchy when seeking advice in clinical matters.

Although uncertainty plagues many disciplines, its effects are especially palpable in medical training. Medical students, whose training provides textual knowledge for disease, enter residency limited in their ability to apply this knowledge to abstract clinical situations1 or psychosocial aspects of care.2 As residents become more autonomous, unclear expectations of supervising doctors and the ever-expanding medical literature can compound their uncertainty.3 The pressures of time and the learning environment established by attending physicians can contribute to residents’ questions going unanswered.4 Previous literature has also illustrated resident discomfort in executing unsupervised procedures and uncertainty in managing post-procedure complications.5

In these vulnerable moments, performing procedures and transitioning care between providers,6 uncertainty poses a significant threat to patient safety. A conceptual framework has been proposed by Beresford for the types of clinical uncertainty, which includes conceptual uncertainty (the inability to apply abstract knowledge to concrete situations), technical uncertainty, the absence of scientific data or practical skill and personal uncertainty, or the lack of previous relationship with a patient and knowledge of their care wishes.6 Despite the presence of this framework, no study has formally characterised the types of resident uncertainty or corresponding effects on care. This study aims to describe critical incidents occurring as a result of resident uncertainty, the types of uncertainty that plague resident decision making and strategies adopted by residents to deal with their own uncertainty.

METHODS

Inpatient care at the University of Chicago

The general medicine service at the University of Chicago consists of four teams, each with an attending physician who has completed internal medicine residency training, one resident doctor, two interns and, at times, one fourth year medical student sub-intern.7 Each team is on call every fourth night, with a maximum of 10 patient admissions each night. The attending physicians ensure that they are available in the day time to house staff via numerical or text paging and, when no longer in the medical centre, often provide residents with contact information including home and mobile telephone numbers. A mandate from the Internal Medicine Residency Program Director in January 2006 stated that “all admitting resident physicians need to contact [their] attending at least once during the call night to inform the attending of patients admitted under their name” to ensure attending physicians were notified promptly of patients admitted to their service. Those individuals in hospital on any given night include a faculty hospitalist (covering non-teaching services); a senior medicine triage resident, the medicine resident on call and fellow residents on subspecialty services. Fellows are available via page for subspecialty directed questions.

Data collection

The Institutional Review Board approved this study. Between January and November 2006, all internal medicine residents at a single academic tertiary care institution were privately interviewed within 1 week of their last call night of the rotation. All interviews were performed by one investigator (JF) and discussions were audiotaped for clarity and transcribed for analysis. Verbal
consent was obtained from the residents before the interview. Names and any references made to individuals or patients were de-identified to render the interview anonymous. Interviews were conducted at the conclusion of the rotation to prevent influence on decision making behaviour. The critical incident technique was used to elicit patient care decisions made during times of clinical uncertainty. Residents were asked to recall two to three important clinical decisions during their most recent call night, with probes to identify decisions made during uncertainty. Initially used in the investigation of aviation accidents, this technique allows for the documentation of infrequently occurring events via the use of personal observation and experience. Residents were also asked whether they sought advice, and from whom, to resolve their uncertainty.

Data analysis
All de-identified, anonymous transcripts were reviewed by three investigators (JF, VA, JJ) and analysed using the constant comparative methods, with no a priori hypotheses to generate initial categories. These categories were subsequently mapped to the Beresford Model of Uncertainty. Atlas ti (ATLAS.ti Scientific Software Development Company, GmbH, Berlin, Germany) qualitative analysis software, was used to facilitate retrieving, coding and sorting the data. Three independent reviewers (JF, VA, JJ) applied the categorical scheme to all transcripts and reliability testing was performed via triangulation. Discrepancies between reviewers were resolved via discussion until consensus was achieved.

RESULTS
Clinical uncertainty
Between January and November of 2006, 42 of 50 (84%; 47% men, 55% women; 52% postgraduate year 2 and 45% postgraduate year 3) eligible residents were interviewed at the conclusion of the general medicine inpatient rotation. These residents identified 18 discrete incidents which occurred as a result of uncertainty in their clinical decision making. Six major categories of uncertainty emerged during qualitative analysis of these incidents and mapped to the domains of the Beresford Model of Clinical Uncertainty (table 1).

Within the domain of conceptual uncertainty, the major categories observed included uncertainty in decision making at times of transition of care, specifically the determination of whether patients required escalation of care (eg, transfer to the intensive care unit) or were prepared for discharge. Within the conceptual domain, residents expressed uncertainty deciding between diagnostic or therapeutic options and conflict between the resident and the attending physician’s preferences for patient management.

Themes which mapped to the domain of technical uncertainty included uncertainty regarding procedural skill and performance and knowledge of indications for procedures. The uncertainty surrounding the performance of procedures included either technical apprehension or ability to perform the procedure and the immediacy with which the procedure was to be performed. Finally, uncertainty regarding patient wishes and goals of care mapped to the domain of personal uncertainty, in which the lack of a personal relationship with the patient, or a breach of trust in that relationship, led to difficulties with decision making.

Of the 18 critical incidents described by residents as times of decision-making uncertainty, 10 resulted in patient harm. Six patients experienced a delay in an indicated procedure or diagnostic test, two had procedural complications and two had cardiac arrest and subsequently died. Representative patient outcomes are outlined in table 2 along with their sources of uncertainty.

Seeking advice
When residents were asked who they sought advice from to resolve uncertainty, they described a definitive hierarchy of assistance, in which answers were sought from a step-wise chain of four types of individual with increasing seniority (table 3). Coded responses were not treated as mutually exclusive such that a single resident often identified multiple sources of advice, approached in a step-wise fashion. If a question remained unanswered, residents would pursue advice from a “higher” source.

<table>
<thead>
<tr>
<th>Table 1 Categories of uncertainty generated in the present study</th>
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<tbody>
<tr>
<td>Beresford Model domain (n)</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Conceptual uncertainty (11)</td>
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<tr>
<td>Technical uncertainty (6)</td>
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<td>Personal uncertainty (2)</td>
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<tr>
<th>Table 2 Example patient outcomes in cases of resident uncertainty in decision making</th>
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<tbody>
<tr>
<td>Domain</td>
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<tr>
<td>---------------------------</td>
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<td>Personal uncertainty</td>
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*Of the four patients in whom residents expressed procedural anxiety, none received the procedure in question.

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Residents also described facilitators of immediate notification of the attending physician and barriers to seeking their input (fig 1; table 4). Barriers to seeking attending-level advice included: conflict with decision-making autonomy; fear of revealing gaps in knowledge; fear of repercussion; and adherence to the defined hierarchy of assistance. Despite these barriers, residents described scenarios which facilitated earlier involvement of the attending physician. These included the immediate need for escalation of care, having to choose from multiple diagnostic or therapeutic options, when the clinical experience of the attending physician would influence the decision.

**DISCUSSION**

This study suggests resident uncertainty can result in delays of indicated care and, in some cases, patient harm. Gerrity and colleagues have described extensively the stress and anxiety generated by doctors’ clinical uncertainty, and it is these affective reactions to uncertainty which have the potential to result in patient harm.¹⁰ ¹¹ Excessive ordering of tests and withholding information from patients are two examples of doctors’ maladaptive responses to uncertainty with detrimental patient effects.¹² It is important to consider the types of uncertainty encountered by residents and strategies to reduce them in the context of clinical care.

**Table 3** The hierarchy of assistance sought by residents

<table>
<thead>
<tr>
<th>Domain (n)</th>
<th>Major category (n)</th>
<th>Sub-theme (n)</th>
<th>Representative comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources of advice (27)</td>
<td>Colleagues (13)</td>
<td>Peers (10)</td>
<td>“If I have a question about something I will ask the residents around in the workroom because it is mostly on call when I have these questions and um, I’ll ask around with like round table type thing” [R#22]</td>
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<tr>
<td></td>
<td>Senior residents (3)</td>
<td>“you know I would probably say MICU [medical ICU resident] is the main person that I would ask on call, the MROC [senior triage resident] is the other person [R#31]”</td>
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<td></td>
<td>Sub-specialty fellow (6)</td>
<td>“sometimes I curbside the appropriate fellow, I think I do that quite a bit, I think I do that more than talking to the attending” [R#28]</td>
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<td></td>
<td>Literature (6)</td>
<td>“I do ‘Up-to-Date’ first … then try to get a differential … then come up with something”[R#21]</td>
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<tr>
<td></td>
<td>Attending physician (2)</td>
<td>“So if I have something that is really pressing I would probably page my attending because you know he’s my boss and so I know I would turn to him for advice unless its something, you know I would if it was difficult or pressing” [R#27]</td>
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**Figure 1** Clinical decision making as described by residents.
The most commonly reported type of uncertainty, conceptual uncertainty, demonstrates a resident's inability to apply abstract criteria to a clinical scenario, in particular in the setting of the need for escalation of care. Such transitions, escalation of care or discharge, are when patients may be particularly vulnerable. Explicitly laying the groundwork with housestaff care or discharge, are when patients may be particularly vulnerable. The reliance on colleagues, advice (7)

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<td>Barriers to seeking attending physician’s advice (7)</td>
<td>Conflict with decision making autonomy (2)</td>
<td>“it was a pain to kind of run by things with [the attending] … because it would kind of influence things too much and then you wouldn’t get a chance to make up your own mind and figure it out.” [R#21]</td>
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<td></td>
<td>Fund of knowledge expectations (2)</td>
<td>“I would turn to [the attending] for advice unless it’s something, I would if it was difficult or pressing, but I mean if it’s a question just something that I didn’t know the answer to to …” [R#27]</td>
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<td>Existence of defined hierarchy (2)</td>
<td>“… between [the MICU resident or the MROC] or the other residents, I usually talk to them before I would make a decision to go up the chain.” [R#38]</td>
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<td></td>
<td>Fear of repercussion (1)</td>
<td>I mean [the attending] said I could call him in the middle of the night if I needed anything but I am not going to do that … I am not going to wake him up …” [R#35]</td>
</tr>
<tr>
<td>Facilitators to seeking the attending physician’s advice (6)</td>
<td>Need for escalation of care (4)</td>
<td>“it wasn’t anything that critical it needed to be addressed that night, if I had been I would have been totally comfortable calling my attending because she made it a point to know that that was fine in calling.” [R#38]</td>
</tr>
<tr>
<td></td>
<td>Options in decision making (1)</td>
<td>“I feel like I can call the attendings if I have questions above my head or especially if there are a couple of options of what to do on the question I always run it by the attending to make sure, even if it’s with a text page” [R#37]</td>
</tr>
<tr>
<td></td>
<td>Clinical experience (1)</td>
<td>“but if it were more like a clinical judgment thing and I hadn’t had that situation then I would ask [the attending] …” [R#22]</td>
</tr>
</tbody>
</table>

CONCLUSION

Uncertainty in resident clinical decision making can result in delaying the delivery of indicated care, in some cases resulting in patient harm. Despite the presence of a supervisory figure, residents adhere to an hierarchy when seeking advice in clinical matters.

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Competing interests: None.

Ethics approval: The Institutional Review Board of the Biological Sciences Division of the University of Chicago approved this study.
REFERENCES
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