Residents' reluctance to challenge negative hierarchy in the operating room: a qualitative study

La réticence des résidents à défier une hiérarchie négative en salle d'opération: une étude qualitative

M. Dylan Bould, MBChB · Stephanie Sutherland, PhD ·
Devin T. Sydor, MD · Viren Naik, MD ·
Zeev Friedman, MD

Received: 23 September 2014 / Accepted: 13 March 2015 / Published online: 20 March 2015
© Canadian Anesthesiologists' Society 2015

Abstract

Purpose Our aim was to clarify how hierarchy influences residents' reluctance to challenge authority with respect to clearly erroneous medical decision-making.

Methods After research ethics approval, we recruited 44 anesthesia residents for a high-fidelity simulation scenario at two Ontario universities. During the scenario, an actor, whom the residents were told was an actual new staff anesthesiologist at their university, asked the trainees to give blood to a Jehovah's Witness in contradiction to the

patient's explicitly stated wishes. Following the case, the trainees were debriefed and were interviewed for 30–40 min. The interviews were audio recorded and transcribed verbatim, and the text was coded using a qualitative approach informed by grounded theory.

Results Qualitative analysis of the participants' interviews yielded rich descriptive accounts of hierarchical influences often characterized by fear and intimidation. Residents spoke about their coping strategies, which included adaptability, avoiding conflict, using inquiry as a method for patient advocacy, and relying on a diffusion of responsibility within the larger operating room team.

Conclusions Study results showed that hierarchy played a dominant role in the functioning of the operating room. Participants spoke of both the positive and negative effects of such a hierarchical learning environment. The majority of participants described a negative perception of hierarchy as the norm, and they employed many coping strategies. This study provides insight into how a negative hierarchical culture can adversely impact patient safety, resident learning, and team functioning. We propose a theoretical model to describe challenging authority in this context.

This article is accompanied by an editorial. Please see Can J Anesth 2015; 62: this issue.

Author contributions M. Dylan Bould was involved in the study conception and design and manuscript preparation. M. Dylan Bould and Stephanie Sutherland contributed to data analysis and interpretation. M. Dylan Bould, Stephanie Sutherland, Viren Naik, and Zeev Friedman contributed to critical review of the paper. Devin Sydor assisted with data collection. M. Dylan Bould, Devin Sydor, Viren Naik, and Zeev Friedman contributed to protocol development.

Electronic supplementary material The online version of this article (doi:10.1007/s12630-015-0364-5) contains supplementary material, which is available to authorized users.

M. D. Bould, MBChB (✉)
Department of Anesthesiology, Children's Hospital of Eastern
Ontario, University of Ottawa, 401 Smyth Road, Ottawa, ON
K1H 8L1, Canada
e-mail: dbould@cheo.on.ca

S. Sutherland, PhD
The Academy for Innovation in Medical Education, University
of Ottawa, Ottawa, ON, Canada

D. T. Sydor, MD
Department of Anesthesiology and Perioperative Medicine,
Kingston General Hospital, Queens University, Kingston, ON,
Canada

V. Naik, MD
Department of Anesthesiology, The Ottawa Hospital, University
of Ottawa, Ottawa, ON, Canada

Z. Friedman, MD
Department of Anesthesiology and Pain Management, Mt. Sinai
Hospital, University of Toronto, Toronto, ON, Canada

Résumé

Objectif Notre but était de clarifier la façon dont la hiérarchie influence la réticence des résidents à remettre en cause l'autorité dans le cas de prises de décisions médicales manifestement erronées.

Méthodes Après l'approbation du comité d'éthique de la recherche, nous avons recruté 44 résidents en anesthésie pour un scénario de simulation de haute fidélité dans deux universités ontariennes. Dans le scénario, un acteur, présenté aux étudiants comme étant un véritable anesthésiologiste travaillant dans leur université, a demandé aux stagiaires d'administrer du sang à un Témoin de Jehovah, en contradiction avec les souhaits explicitement exprimés du patient. À la suite du cas, les stagiaires ont eu une séance de compte rendu et ont passé un entretien de 30 à 40 minutes. Les entretiens ont été enregistrés puis transcrits mot pour mot; le texte a alors été codé en utilisant une approche qualitative reposant sur une théorie ancrée dans la pratique.

Résultats L'analyse qualitative des entretiens avec les participants a fourni de riches descriptions de l'influence de la hiérarchie, souvent caractérisée par de la peur et de l'intimidation. Les résidents ont parlé de leurs stratégies de réponse face au stress qui incluaient l'adaptabilité, l'évitement des conflits, le questionnement comme méthode de défense des patients, et en faisant appel à une diffusion de la responsabilité sur l'équipe élargie de la salle d'opération.

Conclusions Les résultats de l'étude ont montré que la hiérarchie jouait un rôle dominant dans le fonctionnement de la salle d'opération. Les participants ont parlé des effets à la fois positifs et négatifs d'un tel environnement pédagogique hiérarchique. La majorité des participants ont décrit une perception négative de la hiérarchie comme étant la norme et ils ont utilisé de nombreuses stratégies de réponse au stress. Cette étude fournit un aperçu sur la façon dont la culture hiérarchique négative peut nuire à la sécurité des patients, à l'apprentissage des résidents et au fonctionnement de l'équipe. Nous proposons un modèle théorique pour décrire le défi de l'autorité dans ce contexte.

It is increasingly understood that human factors which contribute to effective teamwork and communication are as important in preventing negative patient outcomes as the "medical expert" competencies of individual physicians.¹ The perioperative environment is characterized by relatively large and complex teams with members at different levels of training and with varied roles in high-acuity time-critical situations. Thus, these human factors are particularly

pertinent in this context. Anesthesiology has led the medical profession in adapting crisis resource management training from high-reliability organizations, e.g., aviation, to improve communication in team-based medicine.² Within that frame, team-based educational interventions have been shown to reduce surgical mortality.³

Perioperative teamwork exists within a context of both explicit and implicit hierarchies.⁴ There are multiple power gradients within and between different professions and medical specialties. For instance, while there is a clear line of command between attending anesthesiologists and their residents, there may be a less formal status asymmetry between anesthesia and nursing (although the hierarchy may be quite clear to the individuals in the team) and more fluid power relations between surgery and anesthesia, depending on the individual physicians and the clinical context. A team's dynamic may be relatively egalitarian or more hierarchical depending on many factors, including individual leadership and followership styles and cultural differences at many levels – from national characteristics^{5,6} to the culture of a specific institution.⁷ Previous research has shown that subordinates within a hierarchy are often unwilling to challenge their superiors, even when it's clear that failure to do so risks unethical practice or serious patient harm.^{8,9} A prominent example is the high profile case of Elaine Bromiley, a young previously healthy woman who died from hypoxic brain damage during elective surgery when deprived of attempts at a surgical airway. Despite perioperative nurses knowing that a surgical airway was the required management, they were either unable or unwilling to challenge the airway management of two consultant anesthesiologists.¹⁰

The purpose of this study was to use high-fidelity simulation to explore why anesthesia residents made either strong or weak challenges to authority and to prompt further discussion from them on similar situations that have occurred in their clinical training, including their general perceptions of hierarchy in medicine.

Methods

Simulation phase

This multi-centre study was performed at two university departments of anesthesiology (University of Ottawa, Ottawa and Queen's University, Kingston) in Ontario, Canada. We obtained institutional research board approval from both institutions (approved October 2010 in Ottawa and February 2011 in Kingston). This manuscript describes the qualitative phase of a mixed-method study; the quantitative data were previously published.⁹ We recruited 49 anesthesiology residents to participate in a

high-fidelity simulation scenario, and written informed consent was obtained from each trainee before participation. We used deliberate deception in the scenario by telling the residents that the purpose of the exercise was to examine teamwork. We also disguised the fact that the attending anesthesiologist in the scenario was a confederate, that is, an actor in the simulation scenario rather than a participant. The same actor acted as the confederate in both institutions. The residents were told that the attending anesthesiologist was a new recruit at their university whom they could expect to work within their next rotation. During the scenario, the confederate asked the trainee to give blood to a Jehovah's Witness patient in contradiction to the patient's explicitly stated wishes.

The participants were randomized to two different patterns of team behaviour. For randomization, a sealed envelope technique was used with stratification by postgraduate year to a simulated operating room team with scripted behaviour intended to recreate either a hierarchical team climate (Group H) or a non-hierarchical environment (Group NH). The Table describes the team behaviour in each group. The operating room team consisted of actors trained to play scripted parts of two nurses, a consultant surgeon, and a consultant anesthesiologist. To summarize the results from the quantitative phase of this study, the primary outcome measure was the modified Advocacy Inquiry Scale (mAIS), which measures the strength of a challenge against authority. The median mAIS scores did not differ between the two study groups; consequently, we did not differentiate the two groups for the qualitative phase described in this paper. Instead, we analyzed all residents together. The mAIS score did differ by postgraduate year, with final-year residents making effective challenges and second-year residents making median challenges that were either isolated inquiries or an advocacy statement without any further discussion. Despite knowledge of the patient's refusal, the majority of trainees in both groups checked and gave blood to a simulated Jehovah's Witness patient in this

simulated crisis scenario. Further details of the simulation have been published.⁹

Immediately following the simulation scenario, the residents were debriefed by one of the investigators (D.T.S. or M.D.B.) in order to reveal the deception in the scenario, provide facilitated reflection on their performances, and teach strategies for effectively challenging authority in crisis situations. The debriefing sessions were video recorded, transcribed, and qualitatively analyzed using a grounded theory approach.^{11,12}

Data collection

Following the debriefing session, the residents participated in a 30-45 min semi-structured interview with a trained research assistant who was not known to them and had no identifiable position of power over them. Each participant was interviewed independently in consideration that some issues may be personal and may evoke emotional responses and that using focus groups may not allow some participants to speak freely. Before exploring more general questions about hierarchy in the perioperative environment, the interview began by collecting background information from the resident and then discussing the resident's experience in the simulation ([Appendix: Interview Guide](#)). The conversation was allowed to diverge from the questions in the interview protocol if the resident was describing events or opinions that remained pertinent to the aims of the study.

We planned for the possibility that describing their experiences with power or hierarchical relationships during residency might be sensitive or uncomfortable, evoke negative reactions for some of the participants, and even potentially cause some distress.¹³ If the situation arose where the resident had an emotional response (e.g., crying or becoming visibly distressed in some other way) the following steps were followed:

1. The resident was allowed time to regroup;
2. The interview resumed if the resident indicated a wish to continue and was able to do so;

Table Participant characteristics

	Group H – Behaviours reinforcing a steep hierarchical climate	Group NH – Behaviours reinforcing a flat hierarchical climate	All participants
Total	26	23	49
Female	17 (65%)	18 (78%)	35 (71%)
PGY-2	7	5	12 (24.5%)
PGY-3	6	6	12 (24.5%)
PGY-4	7	7	14 (28.6%)
PGY-5	6	6	11 (22.4%)

PGY refers to postgraduate year. Group H = hierarchical; Group NH = non-hierarchical

3. The interview was discontinued if the resident continued to experience an uncomfortable level of distress;
4. In the case of unusual distress or response, the interviewer informed the principal investigator of the situation immediately following completion of the interview;
5. The principal investigator was then responsible to follow up with the resident and to ensure that the resident was provided with access to supportive resources, if required.

Data analysis

All interviews were audio recorded, transcribed verbatim, and de-identified. Subsequent analysis was through an iterative process of coding (S.S., M.D.B.) using an emergent and exploratory approach informed by grounded theory.¹² In doing so, we began by affixing codes to interview transcripts, and we carefully noted reflections or remarks as we coded. Next, we began a constant comparative process of iteratively sorting and sifting through the transcripts to identify similar phrases, relationships between variables, and common meanings. As a result, we were gradually able to elaborate a small set of generalizations that covered the consistencies discerned in the data set.

The recordings of the debriefings were transcribed and included in the analysis on a purposive basis if the investigators thought that this would help clarify ambiguous points in the interviews. In an effort to avoid a narrow focus, we utilized a framework that allowed for emergent themes. Next, a combination of manual and software-assisted (NVivo; QSR International Pty Ltd, Doncaster, Vic, Australia) coding was undertaken for the interview and debriefing data. To increase the validity and reliability of our findings, we undertook a process of inter-rater reliability or confirmability,¹⁴ and in doing so, three of the authors engaged in a coding process that culminated in ensuring approximately 80% agreement on the independent naming of the codes from the study transcripts. Specifically, each of the three coders independently coded the first transcript and then met as a group and reviewed the codes together. This process was repeated with several other transcripts until agreement in the codes reached 80%. The following formula was used for this process: reliability equals the number of agreements divided by the total number of agreements plus disagreements.¹¹ We took care to implement a process for retaining an audit trail of all analytical memos and meeting minutes by creating and maintaining a code book (available as Electronic Supplementary Material). We were

confident that our data collection had reached a point of thematic saturation when we no longer found new themes (codes) in our data, that is, when all themes had been captured and the remaining transcripts began to yield the same themes as those previously identified. As a secondary analysis, we compared the transcripts from residents with the five best mAIS (high-performing) with the transcripts from those with the five worst mAIS (low-performing).

Results

Participants gave rich descriptive, though generally negative, accounts of pervasive hierarchical influences in the operating room, often characterized by fear and intimidation. Nevertheless, there was some discussion of the positive aspects of a hierarchical team climate. Through an iterative process of coding and recoding, we found three main emergent themes: operating room culture, coping mechanisms, and effects of a hierarchical team climate. Other codes and their relationship to the main themes are shown in Fig. 2. Residents spoke about their coping strategies, which included adaptability, avoiding conflict, using inquiry for patient advocacy, and relying on a diffusion of responsibility within the larger operating room team. Throughout the rest of the Results section, we expand on and illustrate these main themes and sub-codes by using selected examples of qualitative data. Our raw data set is available upon request, as permissible by our research ethics approval.

Operating room culture

Residents from both institutions involved in the study described their perceptions of a culture with a “steep” hierarchy within the perioperative team, both in the simulation scenario and in actual clinical care. Consistent with the findings of the quantitative phase of this study, few residents managed to mount an effective challenge to inappropriate patient care in a simulated crisis situation.⁹ Residents perceived this lack of recognition as devaluing their role within the team as well as their potential contributions to patient care.

This hierarchical climate appeared to be highly pervasive, if not ubiquitous in the perioperative environment: there were no participants who diverged from this description. Hierarchy appears to be a fundamental part of the informal curriculum at both the undergraduate and the postgraduate levels.

Interviewer: “How do you know that there is that hierarchy? Like I mean it’s not, is it taught in school? Is it taught, like okay, you’re...?”

Resident 3: "It's embedded into you from day one of medical training."

The hierarchical climate was not only within the anesthesia team but also within the larger perioperative team, including the surgeons.

Resident 26: "...because the hierarchy is well established with the surgical staff, and like revered... I think they pride themselves on sort of abusing the junior residents."

Residents pointed out that, especially in their junior years, they were made very aware of their position below the nursing staff in the operating room hierarchy, which really became obvious at times when they were left alone with the patient.

Resident 16 "I find there is also a big power struggle between the nursing staff and the new residents. I mean they really want to set them straight early on, and they love that last little kick at the can before you graduate, and I think I've almost graduated out of the kicking spot. But, I mean, I think it's a big problem too because the second your staff leaves the room, I mean, they're just on you."

The personalities of those higher in the hierarchy set the mood of the operating room. Sometimes it is not clear who is in charge or at the top of the hierarchy, especially when it involves the surgical and anesthesiology teams.

Resident 7: "Sometimes it's the loudest [laughs], unfortunately. Sometimes you know who's in charge by the one who steps back and is directing traffic. But sometimes it's very, very subtle things to know who's... I would say in charge, I guess at the top of the power structure, I mean..."

Factors affecting positioning within the hierarchy

Many factors were mentioned that affected the position of the trainee within the hierarchy of the perioperative team. A key factor was the resident's experience or postgraduate year, and this was also found to be a statistically significant factor in the quality of challenge in the quantitative part of the study.⁹ Some participants also noted that sex was an important factor.

Resident 7: "Plus I think oftentimes there's gender issues, absolutely, you know. Whether it's a female anesthesiologist, male surgeon, or vice versa, it's sometimes... I find it difficult to bridge the hierarchy when there's gender differences."

Sex also appeared to intersect with personality and even physical attributes.

Resident 7: "Well I think many of us, now I mean if a female is assertive she's labelled much differently than if a man is assertive... I mean because in all honesty, even a senior resident, if the resident is a 6'5" male and I'm a 5' female and we both say the same thing, I strongly believe

they'll take the 6 footer male's opinion over mine because that's just the way the system is designed. You know, right or wrong it's still... There still are gender differences, absolutely."

Implicit boundaries

The culture of the operating room was described in terms of obstacles or boundaries that must be respected – but are generally not made explicit – in order to negotiate the role of an anesthesia resident successfully. For example, in clinical practice, every consultant anesthesiologist might have a different way of handling the detailed management of each case and the trainee is expected to anticipate this distinction. If the resident were to manage the case according to the preferences of another consultant in the same institution, it might be viewed as unacceptable behaviour. Some respondents at one institution described these implicit rules and boundaries as actually being made explicit: they referred to the existence of a secret book that residents kept to inform each other of how they should behave when working with different consultant anesthesiologists.

Resident 16: "On the first day of my residency I came in very early, drew up all the medications I thought would be appropriate for the first patient. My staff anesthesiologist came into the OR and asked if those were my drugs, I said yes. He proceeded to throw them in the garbage and didn't talk to me until after lunch. That was my first day of residency."

The informal and hidden curricula

The informal and hidden curricula are terms that refer to events or structures that are unrelated to any formal or published curriculum but have a profound effect on learning.¹⁵ An example of the informal curriculum would be *ad hoc* conversations in the coffee room that may have a positive or negative effect on learning. The hidden curriculum refers to subtler structural issues, for example, the effect of differential incomes in different professions or medical specialties on residents' perceptions of the value of those professions or specialties. Residents described some positive experiences challenging decisions in the operating room, but more often these were negative. Hierarchy in the workplace was cited in many teaching moments:

Resident 36: "Well, you know, you learn through shock and trauma so when you're yelled at you never forget, right. So you know these things, these little things here and there. For the most part, you don't tend to remember the people who are lax but the people who are strict and give you s—about stuff you make sure that you do it their way."

This quotation speaks to issues of professionalism and also to the informal and hidden curricula.¹⁵ Residents

described being taught that their opinions were not valued and that they should not create problems for themselves. This is in stark contrast to key parts of the formal curriculum, such as the Royal College of Physicians and Surgeons of Canada's CanMEDs competency domains of Collaborator and Communicator.¹⁶

Coping mechanisms

Conflict avoidance

Residents not only learned the practical management of anesthesia, but they also learned not to "stick their head above the parapet".

Resident 4: "Unfortunately, residency trains you not to be conflict prone, which I find is a bit stupid, I'm sorry, but you know. In a way that even though you are right you still have to suppress your emotions and you still have to suppress your feelings because you don't want to be conflict prone. And even if you are right in your decision-making and the nurse was wrong, the nursing support is so high that they still say, well you know you're a doctor, you should not...So if a residency training tells you that you should not be conflict prone...you should basically step down from the conflict. This is how residency is done. This is how they train us."

Coping mechanisms described included avoiding conflict and using inquiry for patient advocacy to avoid appearing to make a direct challenge to authority.

Resident 26: "In my mind I was like, I'm going to say what I feel like but in the form of a question so that she doesn't think I'm challenging her. You know, like I'm asking her."

When asked about the simulation scenario, most residents said that they did not think that they would have behaved differently in an actual clinical scenario, and some insisted that they would still avoid any conflict with their consultant despite being debriefed on effective ways to challenge authority in a clinical crisis using the advocacy-inquiry technique. One resident told the interviewer of a conversation he had with his father (who was also an anesthesiologist).

Resident 20: "He said to me, the lesson I want you to always learn is that to swallow your pride, just go with whatever they [the consultant anesthesiologist] say and don't be argumentative. So, that is definitely always there in the back of my mind. So, that's what I do, whatever staff I am working with they'll say, "Oh you have to do it this way", and I go, "Oh, I didn't know that, that's very smart." And when I am with another staff I'll do it their way. And you just try to remember it so the next time you are working with the same staff you do it their way."

Diffusion of responsibility

A very frequent emergent theme was diffusion of responsibility for patient care, a form of coping mechanism. Residents described themselves as being in the role of a bystander. An example from the simulation scenario was a resident who considered that he hadn't actually "given blood" to the patient. Despite acknowledging that he spiked the bag of blood and hung it on the intravenous line, in his view, he was just doing what he was told and someone else made the decision.

Resident 1: "...I feel like whenever I'm in the OR with a staff technically I'm a guest in their OR. They allow me to come in on a case with them and learn from them. So it's not my place to, you know, push them out of the way and say, this is what I'm going to do."

When asked about their role within the perioperative team, many residents seemed to have a very individualistic perspective with more of a focus on their own needs than on being a "team player". One resident commented that the most important thing for him was that, if the regulatory bodies in Ontario investigated a case, he would never be found ultimately responsible for the case and would escape legal repercussions as he was following the directions of his attending. In his view, any real responsibility for a patient began once training was completed.

Effects of a hierarchical team climate

The effect of power relations on patient care

Residents cited numerous situations of the negative effects of power differentials on actual patient care, i.e., where negative outcomes could have been avoided if trainees were permitted to contribute more of their knowledge and skills within the perioperative team. Examples included instances where surgeons continued to operate despite the insistence of members of the anesthesia team that the patient was too unstable. This resulted in excessive blood loss and its sequelae and the administration of inappropriate doses of anesthetic drugs which led to negative patient outcomes.

Positive perspectives on hierarchy

Other participants also reported that hierarchy is not only a ubiquitous part of healthcare but also a necessary one, especially in time-sensitive crisis situations where directive leadership and residents' deference to the expertise of the consultants were seen to facilitate effective care.

Resident 7: "There's always somebody in charge...there's always a hierarchy, and I think there almost has to be. You can never have X number of people

in charge. In a critical situation there has to be somebody in charge.”

The tradition of gradually increasing responsibility was also considered to be a key feature of postgraduate training. Hierarchy was also described as being part of an effective and positive learning contract, especially with junior learners.

Resident 26: “In anesthesia there’s definitely a hierarchy...there’s no question. I think it’s good for the patient. There’s a safety issue there, the staff do know the most and as you go down you sort of know less and less.”

Other residents cited positive examples from their clinical training where an anesthesia staff was a clear and directive leader in a crisis situation but still listened to

feedback and other ideas during the crisis and changed management appropriately as a consequence. They highlighted the importance for the team leader not to consider the challenges to the management plan as a challenge to their position in the hierarchy or to feel the need to become defensive.

Discussion

Residents in our study described a steep hierarchy as an inevitable feature of the perioperative environment that played a dominant role in operating room functioning. This hierarchy was described as often having negative effects on the well-being of trainees as well as on learning and patient safety. Nevertheless, residents also acknowledged positive effects of hierarchy in exactly the same areas. We are mindful that we used a potentially stressful simulation scenario to prompt more general discussions on hierarchy and that a negative emotional response by residents may have been overrepresented in the responses. Nevertheless, the effects of hierarchy were generally described with respect to actual clinical events that have occurred, sometimes with clear patient harm, and it seems likely that this important content was well remembered.

We propose a theoretical model (Fig. 1) that may facilitate understanding how the “challenging authority in a crisis” situation can be conceptualized in future research or in case studies. In this model, a challenge could be either strong (clear, effective, and timely communication and actions) or weak (oblique comments, ineffective or tardy communication and actions), largely based on the results of the quantitative phase, described elsewhere.⁹ Our

Fig. 1 Theoretical model. Theoretical model describing the interaction between the team dynamics and the clinical situation relating to challenging authority in healthcare

Fig. 2 Coding tree. Diagram showing the relationships between the main emergent themes and sub-codes that were developed during the analysis

qualitative data suggest that the strength of the challenge seems to be strongly related to the way individuals position themselves within the rest of the perioperative team. Nevertheless, this interaction between the individual and the team is embedded within a broader medical culture and is perpetuated by the informal and hidden curricula of the institution. In our model, the other axis describes the effect of the challenge (or lack of challenge) on the learners, their learning, and the patient. In some situations, a challenge was described as clearly beneficial, whereas in others, the challenge may not be helpful or may even result in a negative outcome for the trainees or the patients. Perhaps the absence of that challenge would instead have resulted in more efficient care.

Different perioperative teams could potentially fall into different quadrants within this model. Our data (and other literature) have numerous examples relating to the “weak challenge/beneficial result” quadrant when a strong challenge is required to prevent harm but instead there is a weak or ineffective challenge. We also found several examples of the “strong challenge/beneficial result” quadrant where a strong challenge is appropriately applied. It seems likely that we should aim to educate and empower our residents to perform in that quadrant. The “weak challenge/detrimental result” quadrant describes when a challenge would be detrimental but no challenge is mounted. Our data suggest that this situation, or more often something between “weak challenge/detrimental result” and “weak challenge/beneficial result” – no challenge is made and it doesn’t really make any difference either way – is the norm within a perioperative team, largely due to the competence of consultant physicians and the effectiveness of teams and systems of care. Perhaps the fact that most of the time it doesn’t matter if you don’t challenge helps to perpetuate the reluctance of trainees to challenge superiors. The final quadrant, “strong challenge/detrimental result”, describes a situation where the resident strongly challenges their superiors and the challenge results in negative consequences. Interestingly we found no evidence of behaviour in that quadrant in our data and have also not found descriptions of this kind of situation in the literature. Responses of the residents in the interviews lead us to suspect that residents fear ending up in this quadrant and know that, most of the time, if they don’t challenge, there will be no harm. We also suspect that this fear is a significant contributor to a failure to act within the “strong challenge/beneficial result” quadrant and to make a strong challenge when needed.

A comparison between participants with a high mAIS and a low mAIS was not the primary focus of our analysis; however, it did give the impression that high-performing residents in the simulation scenario were more aware of the importance of the axis describing the clinical effects of the

challenge, and the low-performing residents were acutely aware of the potential negative effects that a strong challenge would have on themselves as individuals. Future research in other institutions and areas of healthcare is needed to establish whether this would be an appropriate model to describe team behaviour and challenges to authority in other contexts, as well as whether it would be a useful educational model for improving the understanding of these issues within the perioperative team.

Focused educational programs for residents may provide them with the competencies necessary to challenge staff management decisions in a clear and effective manner when patient safety is at risk. Nevertheless, the dominant role of conventional medical culture in the perioperative environment leads us to conclude that simply considering this as a lack of learner competency is likely to be ineffective. Institutional and professional cultures are much harder to change than individual competencies; however, this seems to be necessary. This could begin with an increased understanding of this issue by both “subordinates” and “superiors” within the various hierarchies found in the perioperative environment. Teams working in the perioperative setting may benefit from collaboration with high-reliability organizations where teams and cultures are less challenge averse.⁸

Pian-Smith *et al.* studied an educational intervention (the “two-challenge rule”) designed to improve United States anesthesiology trainees’ competence to challenge authority. The investigators did not include a formal qualitative analysis of barriers to challenging authority in their study, but they listed perceived barriers: assumed hierarchy, fear of embarrassment of self or others, concern over being misjudged, fear of being wrong, fear of retribution, jeopardizing an ongoing relationship, natural avoidance of conflict, and concern for reputation.⁸ These factors are aligned with the more in-depth qualitative responses in our study. Kobayashi *et al.* used a quantitative questionnaire to investigate the willingness to challenge authority in United States and Japanese residents.⁷ They found some differences in personal beliefs regarding communication and safety between Japanese and United States trainees but no difference in their self-reported willingness to challenge authority. Nevertheless, we are aware that the prediction of future actions by the self is often inaccurate,^{17,18} and it is not clear whether the reported willingness to challenge authority accurately represents residents’ behaviour. Our study has built on this by examining actual behaviour in a simulated environment.

Vivekananda-Schmidt and Vernon used qualitative methods to investigate how foundation year 1 trainees in the United Kingdom would respond to ethically

challenging experiences.¹⁹ A key theme in their data was trainees knowing their place, i.e., reporting “tensions between their perception of the right thing to do and what they perceived as clinical norms”. Their trainees noted that challenging authority was an important but difficult part of ethical practice as a trainee. Sutcliffe *et al.* interviewed residents from an institution in the United States who described “mishap incidents”, including some major errors that led to patient deaths. They referred to the influence of a steep hierarchy in their context and pointed out that residents avoided communication with superiors when they feared appearing incompetent.²⁰ Thomas *et al.* similarly highlighted the detrimental effect of a “structured” (steep) hierarchy on communication between doctors and nurses in the neonatal intensive care unit.²¹ In contrast, Rabøl *et al.* describe a “flat hierarchy” between nurses and doctors in Denmark, facilitating communication. They cite the egalitarian society of Denmark as a potential cause and point out structural issues that hint at the effect of the hidden curriculum: salaries are fairly similar between nurses and physicians.⁴ We recognize that the majority of studies in this area cite a steep hierarchy as a significant influence in healthcare. It seems likely that the themes that emerged from our data may be relevant to practice in many contexts in North America and elsewhere. Nevertheless, we may have much to learn from cultures that manage to promote a flatter hierarchy with a clear potential to impact patient safety.

Our study has several limitations. First and foremost, we interviewed only anesthesia trainees and cannot comment on the perspectives of the rest of the interprofessional perioperative team. A current study in progress aims to address this limitation. Subjects in the study were limited to residents in only two universities in Ontario, and findings may not necessarily generalize to other jurisdictions and cultures.^{5,6} There was an imbalance of sex in the group allocation with many more female than male subjects. There may be important differences in perspective on hierarchy and challenging authority due to factors related to sex, age, ethnicity, and being an international medical graduate, but this study was not designed to compare subgroups; however, this may be a valuable subject for further research.

To conclude, the results of this study showed that hierarchy plays a dominant role in the functioning of the operating room. Participants spoke of both the positive and negative effects of such a hierarchical learning environment. This study provides insight into how a negative hierarchical culture can adversely impact patient safety, resident learning, and team function. We propose a theoretical model by which the relevant team dynamics may be better understood.

Acknowledgement Thanks to Dr. Elaine Van Melle PhD, Department of Family Medicine, Queen’s University, Kingston, Ontario, Canada, for her assistance in developing the interview protocol.

Conflicts of interest None declared.

Financial support This work was supported by The Academy for Innovation in Medical Education, University of Ottawa, ON, Canada.

Appendix

Interview protocol

Introduction

You have just participated in a simulated operating room scenario. As described during the debriefing, the purpose of the simulation was to gain a better understanding of how the existence of a hierarchy influences resident willingness to challenge authority with respect to medical decision-making. Through this interview we are interested in gaining a more in-depth understanding of your experience.

The interview portion is broken into three parts. First, I will start with some background information about your experience as a resident. Next, I am interested in finding out more about your experience during the simulation experience. Finally, I will ask you some questions about your general background experience with hierarchy and decision-making in the operating room. It shouldn’t take any longer than 45 minutes. There are no right or wrong answers.

With your permission, the interview will be audiotaped. As indicated on the consent form, only the researchers will have access to the data. Confidentiality of the responses will be maintained during the reporting of the results. As well, your participation in this research will in no way influence assessment of your performance as a resident. At any time during the interview process, you may choose not to answer a question.

Do you have any questions about the study and use of the data before we begin?

Let’s begin with **Part 1 – Background Information**

1. What is your area of specialization and year of residency training?
2. Please describe how much exposure you had to participation in the operating room as part of your training as a medical student and/or resident to date?
3. What has your role as a resident been in the operating room?

For example, observing, assisting with procedures, performing procedures ...

Part 2 – Now I would like to turn to the simulation you just experienced.

4. I would like to begin with your feedback regarding the authenticity of the simulated scenario you just experienced. More specifically, I would like to know if the experience was similar to what you have typically experienced as a resident in the operating room. At this point, I am not asking for you to comment on the particulars of this situation, but rather on your overall experience. In what way was your experience similar to actually being in the operating room? In what way was your experience different?

Note: We are looking for both physical fidelity in terms of the actual setup of the experience as well as psychological fidelity in the sense of how well the simulation evoked in the participant the actual interactions, feelings, and responses associated with being a resident in the operating room.

5. Now I would like to talk about your specific experience in the situation. Can you please walk me through the scenario and describe your reasoning as you decided how to respond.

With this question we are looking for:

- How they describe the atmosphere in the simulated operating room when they first began participating (e.g., “a bit tense” or “friendly”);
 - How the atmosphere impacted on their response within the scenario – if at all;
 - At which point they decided that something may not be quite right with the decision-making process;
 - What kind of alternative strategies they considered in forming their response;
 - How they felt throughout the scenario.
6. In your residency training to date, have you ever encountered similar situations where you felt that you had to challenge the decisions being made with respect to the care of the patient?
If so, please describe the situation.
7. Do you anticipate that, after participating in this simulation, you might respond differently should a similar scenario arise in an actual patient care situation?

Part 3 – Now I would like to finish with a few questions regarding your experience of hierarchy in decision-making in the operating room during your residency.

8. More specifically, I would like to know the extent of your experience with power differentials in the operating room. Can you describe these power

differentials? For example, who seems to be “on top”, who seems to be on “the bottom”, and how do you know? Are these differentials consistent from situation to situation?

9. What are the effects of the power differentials on team members and how they respond and/or perform?
10. Have you observed any effects of the power differentials on patient care?
11. This is the end of our formal questions. Is there anything that we have missed or that you would like to add?

References

1. Kohn LT, Corrigan JM, Donaldson MS. To Err is Human: Building a Safer Health System. A report of the Committee on Quality of Health Care in America, Institute of Medicine. Washington, DC: National Academy Press; 2000.
2. Howard SK, Gaba DM, Fish KJ, Yang G, Sarnquist FH. Anesthesia crisis resource management training: teaching anesthesiologists to handle critical incidents. *Aviat Space Environ Med* 1992; 63: 763-70.
3. Neily J, Mills PD, Young-Xu Y, et al. Association between implementation of a medical team training program and surgical mortality. *JAMA* 2010; 304: 1693-700.
4. Rabol LI, McPhail MA, Ostergaard D, Andersen HB, Mogensen T. Promoters and barriers in hospital team communication. A focus group study. *J Commun Healthc* 2012; 5: 129-39.
5. Hofstede G. National cultures in four dimensions: a research-based theory of cultural differences among nations. *International Studies of Management and Organization* 1983; 13: 46-74.
6. Basabe N, Ros M. Cultural dimensions and social behavior correlates: individualism-collectivism and power distance. *International Review of Social Psychology* 2005; 18: 189-225.
7. Kobayashi H, Pian-Smith M, Sato M, Sawa R, Takeshita T, Raemer D. A cross-cultural survey of residents, perceived barriers in questioning/challenging authority. *Qual Saf Health Care* 2006; 15: 277-83.
8. Pian-Smith MC, Simon R, Minehart RD, et al. Teaching residents the two-challenge rule: a simulation-based approach to improve education and patient safety. *Simul Healthc* 2009; 4: 84-91.
9. Sydor DT, Bould MD, Naik VN, et al. Challenging authority during a life-threatening crisis: the effect of operating theatre hierarchy. *Br J Anaesth* 2013; 110: 463-71.
10. Bromiley M. Have you ever made a mistake. A Patient Liaison Group Debate. *R Coll Anaesth Bull* 2008; 48: 2442-5.
11. Miles MB, Huberman AM. *Qualitative Data Analysis: An Expanded Sourcebook*, 2nd ed. Sage; 1994.
12. Glaser BG, Strauss AL. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Transaction Books; 2009.
13. Draucker CB, Martsolf DS, Poole C. Developing distress protocols for research on sensitive topics. *Arch Psychiatr Nurs* 2009; 23: 343-50.
14. Denzin NK. The art and politics of interpretation. In: Denzin NK, Lincoln YS (Eds). *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage Publications Inc.; 1994: 500-15.
15. Hafferty FW. Beyond curriculum reform: confronting medicine's hidden curriculum. *Acad Med* 1998; 73: 403-7.

16. Frank JR. The CanMEDS 2005 Physician Competency Framework – Better standards. Better care – Royal College of Physicians and Surgeons of Canada: Better physicians; 2005.
17. Helzer EG, Dunning D. Why and when peer prediction is superior to self-prediction: the weight given to future aspiration versus past achievement. *J Pers Soc Psychol* 2012; 103: 38-53.
18. Koehler DJ, White RJ, John LK. Good intentions, optimistic self-predictions, and missed opportunities. *Soc Psychol Person Sci* 2010; 2: 90-6.
19. Vivekananda-Schmidt P, Vernon B. FY1 doctors' ethicolegal challenges in their first year of clinical practice: an interview study. *J Med Ethics* 2014; 40: 277-81.
20. Sutcliffe KM, Lewton E, Rosenthal MM. Communication failures: an insidious contributor to medical mishaps. *Acad Med* 2004; 79: 186-94.
21. Thomas EJ, Sherwoon GD, Mulhollem JL, Sexton JB, Helmreich RL. Working together in the neonatal intensive care unit: provider perspectives. *J Perinatol* 2004; 24: 552-9.