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ORIGINAL ARTICLE

One size does not fit all: identifying differences in intraoperative teaching preferences of junior versus senior surgical residents

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Abstract

Purpose Intraoperative teaching is a critical component of surgery residents' education. Prior efforts to guide faculty on best intraoperative teaching practices have failed to address potential differences in the needs of the junior versus senior resident in the operating room (OR). The objective of this study was to determine the qualities of effective intraoperative teachers from the resident's perspective based on their level of training.

Methods Using constructivist grounded theory methodology, categorical general surgery residents of the same post graduate year (PGY) participated in five focus groups to explore their opinions regarding intraoperative faculty teaching strategies. Focus group discussions were recorded, transcribed, and coded in an iterative process. Emerging themes were identified, along with corresponding sub-themes.

Results Thirty-nine general surgery residents participated in the focus groups from June to August of 2021. PGY4 and PGY5 residents were considered "senior residents" and PGY1-3 "junior residents." Senior residents preferred to be allowed to struggle before takeover and valued intentional faculty silence, whereas junior residents disliked silence and appreciated active guidance while operating. Furthermore, while junior residents reported frequent harassment by ancillary staff in the OR without faculty intervention as contributing to a negative learning environment, this was not a factor for senior residents.

Conclusion We identified important differences in the attributes of effective teachers from the perspective of junior versus senior residents which may guide faculty teaching to be the most relevant to the needs of their learners. It is critical for faculty surgeons to be trained to identify harassment and intervene effectively.

Keywords Intraoperative teaching · Surgery resident · Resident training · Faculty development · Qualitative research

Introduction

The goal of surgical residency is to train knowledgeable and technically competent surgeons. An essential component of this training is intraoperative teaching. A recent systematic review demonstrated that, while most surgeons do not receive formal training on how to teach, interventions that improve intraoperative teaching benefit both faculty and trainees [1].

Current guidance on best practices in intraoperative teaching are often developed using master surgeon educators and neglect to include the perspective of the learner [2–4]. Studies have shown that there are considerable discrepancies between attending and resident perceptions of intraoperative teaching [5–8]. Therefore, it is imperative to examine surgery residents' experiences and preferences regarding intraoperative teaching to have a more complete depiction of the learner's needs. To date, no study has described the differences in intraoperative teaching that junior level residents require when compared to their more senior colleagues.

The objective of this study was to determine the preferred qualities of effective intraoperative teachers from the resident's perspective based on their level of training.

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Methods

Study design

From June through August 2021, focus groups were held with categorical general surgery residents at a single, large academic institution. This study was assessed by the Institutional Review Board and was deemed to be exempt from full review. Focus groups were led by two surgical residents: AC was from another surgical program and had no prior relationship with the focus group participants, whereas DD was a surgical resident at the study institution. Both focus group facilitators had prior training in leading focus groups, qualitative methodology, and had taken dedicated time to study surgical education. Interview questions were developed and reviewed by an expert in qualitative methods (KL) and later piloted with a multi-disciplinary surgical education group (Supplement 1) [9].

All clinically active, categorical general surgery residents were approached through email and asked to join focus groups to explore their experiences and preferences of intraoperative teaching. Participation was voluntary. Focus groups were held with each class of residents based on their post graduate year (PGY) and occurred after their weekly protected educational time. Discussions were recorded using ZOOM™ (Zoom Video Communications, Inc, San Jose, CA) and subsequently underwent targeted transcription by the authors (AC and DD). No repeat focus groups took place. Audio was evaluated and field notes taken after the focus groups were completed.

Data analysis

A single coder was employed (AC). Codes were developed using an inductive framework and transcripts were coded using grounded theory methodology. Prior thematic analysis of the focus groups defining the overall qualities of an outstanding intraoperative teacher was used as the conceptual framework to evaluate differences in preferences between junior and senior residents [9]. Utterances from each focus group were categorized into its corresponding theme/subtheme, noting the source focus group as either junior or senior. Junior residents were defined as PGY1-3 and senior residents were PGY4 and 5. Each theme was then evaluated for differences between the two cohorts. Microsoft Excel and OneNote (Microsoft Corporation, Redman, WA) were used to manage the data and perform the analysis. In the presentation of the themes within this manuscript, the terms "more commonly" and "most residents" represents times during the focus groups when several participants uttered agreement with the person talking or when the same sentiment was mentioned by multiple classes of residents within a group (junior or senior).

The findings of this analysis were then presented back to focus group participants, in addition to surgical faculty. This was presented in a grand rounds format and all poll responses were anonymous. All surgeons present were teaching faculty and actively participate in the training of surgical residents of all levels. They were invited to listen to preliminary results of ongoing research projects. Residents and faculty were asked if they had any questions and given the opportunity to voice any concerns. In addition, the faculty and residents were queried separately on their experience in the operating room (OR) using an anonymous e-voting platform. The study followed the reporting standards of the COnsolidated criteria for REporting Qualitative research (COREQ) checklist.

Results

A total of 5 focus groups were held with 39 general surgery residents (80% participation). Two focus groups were held with 14 senior residents and 3 focus group with 25 junior residents. The junior cohort was comprised of 56% female residents and the seniors had 36% female. Demographics are presented in Table 1. There were no participants who asked to be removed from the study. Three themes were identified where there was divergence in junior versus senior-level residents' intraoperative teaching preferences.

Creating a safe learning environment

The first theme related to faculty creating a sense of psychological safety for the learner by cultivating a culture

Table 1 Focus group demographics and attendance by cohort

Focus Group Cohort (N, total)	Mean Participants per Focus group	Mean Duration, minutes	Sex (Female) N (%)	Reason for not participating
Junior (25)	9	51.3	14 (56)	3 residents on night float, 2 residents on vacation
Senior (14)	7	49	5 (36)	2 residents with conflicting clinical duties, 3 residents on vacation

of mutual respect with the OR team, thus creating a safe learning environment. Both junior and senior residents highlighted the importance of this faculty behavior in a good teacher. However, junior level residents reported significant and frequent conflicts with scrub technologists and circulating nurses (Table 2). They described numerous scenarios where OR staff belittled them, refused to hand them instruments, and even cursed and yelled at them, a behavior typical of bullying. The residents described how this phenomenon negatively impacted their ability to learn in the OR and minimized their ability to gain confidence in speaking up in the OR. For example, a PGY2 resident said: *"It can really add to your anxiety, when I ask for an instrument. Like I'm mad that I made something bleed, the attending is mad I made something bleed, you [surgical tech] are not giving us what we want and it's still bleeding. I just feel like 'I just want this to end!' I don't need this to add to it."* Junior residents from multiple classes described these negative interactions without prompting from the focus group facilitators. Furthermore, while residents admitted that these situations occurred more commonly with female residents, male colleagues also voiced similar experiences.

Notably, most residents reported they had never experienced an attending step in and support them in these situations. A single resident described an instance when an attending acknowledged the scrub technologist's aggressive behavior: *"I've had [attending step in] happen once where the scrub was clearly just being obnoxious, and the attending said to me 'Don't worry about it, just ignore it.' It was nice when the attending had my back." -PGY2* While the attending failed to directly mitigate the behavior, recognizing it occurred helped the resident feel validated and supported. Residents felt that because they may only be on service for a month and OR staff often have long-term relationships with the faculty, the attending surgeon is more invested in maintaining the working relationships with the scrub technologist and circulating nurse. The residents also described that when attendings model good leadership and create a culture of mutual respect, this is reciprocated by everyone in the room and a safe learning environment is established (Table 2).

When these data were presented to the department, exploring faculty and resident experience with bullying in the OR, 9/15 (60%) of faculty indicated that they had witnessed a resident being bullied by OR staff. In contrast, 11 (100%) of residents, both junior and senior, had experienced being bullied by OR staff, even though none of the senior-level residents reported this as an issue during the focus groups.

Instructional approach

Another theme involved the attending's instructional approach, specifically the use of intentional silence (Table 2). Resident opinions diverged related to this; senior residents greatly appreciated when an attending surgeon was quiet and refrained from telling them each step. It encouraged them to think critically about the operation and tested their knowledge of the steps. In contrast, silence while operating with junior residents created significant anxiety. Junior residents did not feel they had the fund of knowledge, experience, and/or confidence to go through an operation without direct verbal guidance.

Similarly, a second subtheme within instructional approach acknowledged the utility of didactics during an operation (Table 2). Junior residents, when assisting or observing a case, appreciated micro-teaching moments employed by attending surgeons. They reported feeling more engaged and especially valued when surgeons would discuss hypothetical emergency situations relevant to the present operation. However, junior residents recognized their own limitations and reported being unable to process these teaching moments if they were directly performing technical skills. A PGY3 said, *"I like when people use down time in the OR to teach, but the times when you're doing a hard move and having a high-level conversation about patient care decision making, it feels like something gets lost."* In contrast, senior residents reported that oftentimes the intraoperative lectures given by faculty were not appropriately challenging enough and did not stimulate higher level critical thinking. A PGY5 resident said, "*Dr. X takes you through a case like you don't know any of the anatomy of the case, takes you through each step and describes it like you don't know anything- that's good for junior resident*." Moreover, senior residents reported a phenomenon where faculty would compensate not having the resident technically participate in the case with an abundance of didactics. This was not appreciated at the senior level. Faculty that treated the senior residents more as colleagues and involved them in the intraoperative decision making by vocalizing the thought process was considered more effective. A PGY4 said, "*Out loud problem solving, makes you feel like a colleague, like you are taking part of the operation. He asks, 'what are our other options?', 'Are you ok with this plan?' He makes it a discussion."*

A third subtheme within instructional approach was related to the tactic of attendings physically moving a resident's hands; junior residents generally perceived this as an effective teaching strategy (Table 2). While significant variability was noted in resident opinions on whether they liked this approach, all agreed it was a useful method for teaching tension and pressure on tissues.

Table 2 Representative quotes for differences in intraoperative teaching qualities from senior vs. junior perspectives

Theme	Subtheme	Junior Resident Quote(s)	Senior Resident Quote(s)
Operative Skill	Safe Learning Environment	Conflicts with OR Staff: "I've literally had circulating nurses who have refused to answer my pages, one of them said, 'you are barely even a doctor, I will only answer the attending's pages', and the attending won't say anything. And we're just trying to take care of patients." -PGY2 "It was a two attending case so I was just helping out, the scrub tech and Dr. X was at the back-table looking at the kidney and the other attending was doing the anastomosis and there was a shod sitting on the body and he asked for the shod so I picked it up off the body and put it in his hand and the scrub tech said to me, 'don't you ever fucking touch my instruments.' And the attending never said anything. So, I'm like ok, well I'm not going to do anything in this case." -PGY1 "I've had a situation where they [scrub] won't hand me things but I've still tried to ask and the attending will say, 'You don't need to ask for things, she knows what to give you' but that doesn't help me learn. It's still the staff encouraging the scrub tech to squeeze me through the operation. Just speaking up at this stage is hard, so I want to practice." -PGY1 Faculty support with conflicts: "I don't know if there's a good way for the attending to step in. I feel like if the attending says something, it just makes it awkward. And with the nursing shortage, they're not going to want to upset them." -PGY2 "We're there for a month and we graduate eventually and they [scrubs] are going to stay there and have the staff that they have, so why would they [faculty] do that [step in]?" -PGY2	None

Table 2 (continued)

Theme	Subtheme	Junior Resident Quote(s)	Senior Resident Quote(s)
Instructional Approach	Intentional Silence	"If we're going through a case together that we've never done before and probably a little above my level, and you're saying nothing and wondering why I'm not doing an awesome job. That's why, I don't know what I'm doing." -PGY1	"If you have a good teacher, on a case where they know you likely know the steps as you go through it, if they don't say anything…If they are actually quiet and let you struggle, I think that's a sign of a good teacher" -PGY5 "[Operating in silence] is the only time I felt reassured that I'm doing the case. Even if I'm doing the case and you're telling me the steps, I'm like do I really know the steps." -PGY5
	Intraoperative Didactics	"I like when the attending pulls me in and asks me questions even when I'm not doing anything. Even when they ask questions that don't relate to that specific operation, but are relevant, and theoretically discuss what they would do that emergency situation. It's very helpful." -PGY1	"I think the type of teacher who allows a resident to do the easier parts of the case and try to convince them they did the whole case, are better for junior residents. For example, when Dr. X starts a case, he acts like you've never seen this before. Like you're a child walking in, 'here are the organs, here are the blood vessels, here are planes. He describes everything, which I think is good for someone who didn't know that walking in. He then describes each step…. Obviously, that's beneath our level of training, but I think it's excellent for a junior resident." -PGY5
	Physically moving hands	"In laparoscopic inguinal hernias, Dr. B will often grab your hand and do one swipe and finish the dissection with that one movement with your hand, which is helpful to know that you can be a little more aggressive in the right spot, because I know I can putz around." -PGY2 "I know not everyone likes this, but Dr. C is very good. He will literally grab your hands and puts them where he wanted them to be, I thought it was weird as an intern, but it's helpful because he's not taking it away from you, but you can feel where you should be." -PGY2	
Feedback	Content of Feedback—Explain operative choices	"He's also the type of person who says if you do it this way, these are the implications, if you do it this way, these are the possibilities of where it could go wrong and why I have an operative preference. As opposed to 'I'm the attending surgeon. This is what we're going to do.' Which is how a lot of people are. He's extremely deliberate in his education." -PGY1	

Table 2 (continued)

Theme	Subtheme	Junior Resident Quote(s)	Senior Resident Quote(s)
Resident Need Discernment	Managing Expectations—Predictability of attending		"We appreciate being with the same faculty, doing the same cases over and over again, so those skills get solidified…. I didn't care as much as a junior resident but it's helpful as a chief to learn the pattern." -PGY5
	Individualizing Instruction - Allow resident to fix errors		"Like if you're throwing a stitch in the portal vein and it pulls through, instead of just immediately taking over and doing it themselves, they just hold suction and let you redo it." -PGY5 "To be able to fix something you broke builds your confidence. To be able to know that you're able to fix things in the future." -PGY5
	Autonomy—Definition of autonomy)	"I don't always get the prep right but if they let me do my thing and try to prep the patient, it builds my confidence, I'm in my zone, (I feel like) I'm the surgeon in this situation, compared to staff who literally do everything and you come and just stand there, (I feel like) I'm more just the person holding retractors than someone who's operating." -PGY1	"Autonomy matters, though. Especially at the chief level. Like when I was at the VA, and Dr. S let me do that [PEH] on my own, they didn't scrub in unless I asked them because I needed help. I feel like the fact that they let me do that, made me secure that I can do this case. And that's a good teacher…. Versus, I did [similar case] with another faculty who pretty much did more than 50% of the case, and I felt like I could have done this by myself. Not that you're not a good teacher, but that affected me." -PGY5
	Autonomy from chief resident	"Operating with a chief instead of a staff makes you realize exactly what you're doing because the staff sets you up perfectly for the stitch or to Bovie, and watching someone who is much better than you but not as good as staff makes you realize how much of a struggle just providing exposure can be, and makes you think about how you can assist because it's not just an easy step for them." -PGY1	

Junior residents also appreciated when faculty explained reasons for their operative choices (Table 2). They found it helpful for understanding why faculty have different preferences and learning which situations require various techniques. Residents often encountered faculty who took a more authoritarian approach to teaching, but they found that these experiences left them with considerable gaps in their knowledge. Senior residents did not report these strategies when describing their preferences of intraoperative teaching.

Discernment of resident needs

Senior residents brought a unique perspective to managing expectations. They expressed preference for attendings whose actions and desires were predictable as this enhanced their learning. When a faculty was able to communicate clear expectations and keep them consistent across multiple encounters, residents felt they were more likely to learn and succeed (Table 2). Residents felt that they were in a futile situation when faculty changed their expectations from case to case. Residents felt that they would change their behavior based on initial feedback, however, they would then receive contradictory feedback from the same attending. This left them feeling like there was no path to success. Junior residents did not report this as a preference.

Senior residents also highly valued when faculty allowed them the opportunity to fix their own errors when appropriate (Table 2). This opportunity not only solidified how to technically perform the task correctly, but also gave them confidence in their ability to fix problems they may encounter when operating independently. While junior residents also appreciated patience in their faculty teachers, they did not have the same expectation for fixing more complex problems.

Lastly, residents defined autonomy differently between cohorts. While senior residents were more often focused on technical autonomy during performance of the operation, junior residents saw case preparations and asking for instruments as moments when they could experience autonomy (Table 2). In addition, junior residents felt that by operating with a chief resident, they were able to experience autonomy by proxy; meaning, they felt more responsibility for the case in these situations. They were able to learn more about the benefits of good exposure and challenges of being a good assistant. Although it was often more difficult to operate with a chief, due to the less-than-ideal exposure or set up, junior residents reported that they were more likely to be given a chance to perform maneuvers during a case with a chief resident, compared to an attending, who often relegated the junior residents to an assistant only role.

Discussion

This study identified significant variation in resident preferences regarding the attributes of an effective teacher based on resident level which may guide faculty in adjusting their teaching to individual learner needs. Our results suggest that junior residents often get bullied by more experienced ancillary staff in the OR. Attending surgeons need to be aware of this issue and support residents when it occurs in order to promote a safe learning environment. Further, faculty should be aware that intentional silence when working with a senior resident may help increase confidence in their knowledge and skillset. However, junior residents may require more vocalization and direct guidance during the operation, including explanation of operative choices and physically moving their hands to demonstrate correct technique.

As senior residents often work with the same faculty multiple times over the course of a rotation, consistency and predictability of faculty needs and expectations are important with this level of residents. In addition, allowing senior residents the chance to correct their own technical errors may increase their confidence and ability to perform during independent practice. Senior residents' appreciation of silence while operating or being allowed to struggle was not rooted in a desire to avoid correction or technique adjustment. Rather, senior residents reported value in independent problem solving, or autonomy of thought, under the guidance and safety of a present faculty member. The experience of doing a procedure without being told the steps was an effective experience to build their confidence. Lastly, autonomy is a critical component of resident development and by allowing a junior resident to operate with the chief resident, faculty can enable junior residents to feel the responsibility of the operating surgeon while continuing to have appropriate oversight.

There is a paucity of evidence regarding the impact of resident level on their intraoperative teaching preferences. Prior survey-based studies, investigating the difference in intraoperative teaching perceptions between attendings and residents, were unable to detect a difference between junior and senior residents [6, 7]. Similarly, Vollmer et al. used a survey to compare intraoperative teaching strategies between faculty and residents [8]. In a subgroup analysis comparing junior versus senior residents, junior residents reported that they were more likely to receive spontaneous lectures regarding the case from the faculty than senior residents [8]. There was no further analysis on the efficacy or desirability of this teaching strategy within this study, however, the junior residents in our study valued this teaching strategy more than senior residents. Kissane-Lee et al. found that junior level residents preferred an

explanatory leadership style in the OR [10]. This is consistent with our findings that junior residents prefer a more involved explanation of operative decision making. As a resident matures, faculty should increase the complexity of questions and discuss the nuances of the operation in a way that promotes collegiality surrounding operative decision making.

An unanticipated finding from this study was the importance of creating a safe learning environment for junior residents, free from bullying from OR staff members. While workplace bullying is, unfortunately, not an unknown phenomenon in surgery, it is typically committed within the hierarchy of surgery [11]. However, as our study suggested, junior residents may be especially vulnerable in their interactions with non-physician healthcare workers. Psychological safety within the medical learning environment is defined as the mitigation or exacerbation of risk the learner must take to learn medicine [12]. In a safe learning environment, the trainee will feel secure to ask questions and fully engage in the learning process. How faculty respond to learning behaviors, such as making a mistake, is critical to the creation of a psychologically safe learning environment [12]. Several studies within medical education have shown the importance of a safe learning environment for the development of trainees [13–16]. However, we were unable to find any reports of this phenomenon within surgical education literature. To the best of our knowledge, this is the first report highlighting the importance of psychological safety within the OR. Furthermore, it is critical that surgeon educators understand psychological safety in the OR is not only fostered by a healthy interpersonal relationship between the faculty and resident but is also impacted by the other interpersonal dynamics the learner experiences within the OR team.

Elimination of bullying and promotion of a psychologically safe learning environment in the operating room needs to start with the attending surgeon. It is possible, however, that since most faculty experienced intimidation and bullying during their training [17], they may have become desensitized and might not register when it occurs. Furthermore, they may not even recognize it as a hindrance to effective intraoperative teaching. Gostlow et al. conducted video assessments of simulated operating rooms in which harassments took place [18]. Trainees were more likely to identify situations in which harassment was taking place and intervene. Surgeons had no response in 30% of harassment scenarios [18]. Faculty development efforts need to include strategies for the accurate identification of workplace bullying and training on how to effectively intervene.

This study was not without limitations. The focus group facilitators were surgical residents and, as such, have associated biases of being trainees. Nevertheless, this characteristic may have allowed the focus group participants to speak more freely than if they were interviewed by a more senior member of the research team. While residents reported being affected by the bullying from the ancillary staff in the OR, the true frequency of this phenomenon is unknown; however, these events had a profound impact on junior residents and created anxiety when returning to the OR. Furthermore, organizational culture was not independently explored. This study was conducted at a single, academic institution and represents the experiences of those surgical residents and may not be generalizable to all surgical residents.

In conclusion, we identified important differences in the attributes of effective teachers from the perspective of junior versus senior residents which may guide faculty's teaching to be the most relevant to the needs of their learners. Junior residents require more guidance and explanation during a case, while senior residents benefit from intentional silence. Importantly, junior residents are vulnerable to bullying in the OR, which impedes the establishment of a safe learning environment. Faculty should be taught how to identify harassment in the OR and be given guidance on how to intercede. By addressing the bullying that occurs in the operating room, surgeons can create a psychologically safe learning environment and may mitigate a considerable source of stress and burnout in their residents.

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Declarations

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