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Featured Article

Development of a peer review of operative teaching process and assessment tool

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ABSTRACT

Background: While teaching evaluation systems are common in academia, very little information is available regarding formal coaching and peer review of teaching performance in surgery. This article is a report on the development and implementation of a peer review of operative teaching program.
Methods: Our process was designed using a multistep sequential model which included developing a peer review of teaching instrument that was piloted to study the efficacy and utility of the tool.
Results: Thirty-nine peer reviews of teaching were conducted. Among the most frequent challenges that faculty identified were allowing residents to struggle/give autonomy, judging when to take over the case, communicating effectively, being patient, balancing education and patient safety, and giving feedback.
Conclusions: Our peer review of teaching program is systematic, feasible, and can be adopted by other surgery departments. Faculty's identified strengths and challenges have been incorporated into our faculty development curricula.

1. Introduction

One of the values of our department of surgery is to promote and foster quality teaching and learning, especially when faculty have little formal training in education and yet are expected to teach, and to teach well. We have developed a robust professional development program aimed largely at equipping faculty with effective teaching strategies as well as education on various other key teaching and learning principles.[1] One component of our faculty development program is peer assessment of teaching in the operating room. Chism defines peer review of teaching as "informed colleague judgement about faculty teaching for either fostering improvement or making personnel decisions".[2] It has been an integral component of the faculty evaluation process at many institutions and within various disciplines for years; albeit done on a spectrum of education rigor.[3] There are resources developed to guide educators on how to develop and implement a peer review program.[2–5]

We implemented a peer review of teaching process for multiple reasons: (1) to provide feedback to faculty from an expert reviewer on how well faculty interact and teach learners, (2) to supplement the student and resident perspective provided on end of rotation faculty teaching evaluations, (3) to "spot check" and support faculty after they completed our junior faculty development program, (4) to help faculty meet the requirement of peer assessment for promotion and tenure, and (5) to assist with any learner/faculty teaching remediation needs. As with any faculty development initiative, competing with faculty demands on time is a challenge. The advantage to investing in peer assessment is that it is an "in situ" method for faculty to learn about their teaching effectiveness with the only demand on time being the debrief session which can be scheduled at the faculty member's convenience.

While faculty teach in a variety of settings, the most requested venue for peer review of teaching for us has been in the operating room, which is the focus of this manuscript. To our knowledge, there is sparse literature on how institutions have developed and implemented a peer review of operative teaching process. Additionally, there was no operative teaching instrument that we could find in the literature for a peer reviewer to utilize. Peyre et al. developed an Observation of Teaching Program to support the development of faculty teaching skills in the outpatient clinical setting.[6] Formal coaching programs via video review of cases with coach mentors are gaining traction.[7–9] To aid with this gap in the literature, we developed a peer review of teaching process and constructed an assessment tool to provide formative feedback to faculty on their operative teaching performance. The purpose of this study is twofold: (1) to describe our peer review of operative teaching process and (2) to present our evidence-based operative

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assessment rating instrument.

2. Methods

Our peer review of operative teaching process was developed using a multistep sequential model adopted from Webb and McEnerney's stepwise approach to designing a peer observation system[4] as well as Trujillo et al.'s application of Webb and McEnerney's method in a department of pharmacy.[5] Our process was formulated using the following steps that Trujillo et al.[5] used:

2.1. Establish a clear vision

The purpose of our peer review of teaching process is to promote the improvement of operative teaching and learning of faculty, specifically to identify and affirm faculty teaching strengths and raise awareness of areas for improvement.

2.2. Differentiate between formative and summative review

Our peer assessment process is purely formative in nature to provide early feedback for professional growth and development for junior faculty as well as continued growth for more experienced faculty.

2.3. Identify the program leader and coordinator

The program developer and leader is an expert reviewer who has a doctorate in science education, is recognized as an education leader, and has over 20 years experience in direct observation of teaching and giving feedback to educators. She has been a peer colleague to the surgeon faculty for 16 years. Currently there is no coordinator.

2.4. Identify participants and peer observers

We have over 100 surgeons in our department, all of whom are eligible and approached for peer assessment. The program leader queues the faculty based on participation in the junior faculty development program, those going up for promotion and tenure, and those requesting or in need of peer review. Participation is optional. Currently, the program leader is the only observer. Plans to increase the number of expert, peer, and surgeon reviewers[6] are in progress.

2.5. Establish a process

Our process of peer review follows the clinical supervision model[3,10] of incorporating a pre-conference, direct observation, and a post-conference.

The *pre-observation conference* typically occurs over email. The program leader will email the faculty to request observation of a teaching case and subsequently set up a day and time to observe. Sometimes a more robust pre-conference is held when the expert reviewer and faculty member have time to chat preoperatively at the time of the surgical procedure.

Direct observation by the expert reviewer usually occurs for 90–120 min. For long cases, the reviewer will ask faculty what 2-h window would be most beneficial to observe teaching interactions. Notes are taken by the reviewer and then a teaching assessment form (described later in this article) is completed.

A *debrief meeting* is scheduled within a week of the observation to allow the expert reviewer to identify effective teaching strategies and alert faculty to areas for improvement. Immediate postoperative debriefing, while ideal, is seldom possible due to faculty schedules. Debrief meetings can usually be accomplished within 20–30 min, or however long the faculty member wishes to engage. Each meeting begins with the expert reviewer asking faculty 3 questions: (1) *Did this operative case represent a typical teaching interaction for you?* (acknowledging Hawthorne effect), (2) *What do you feel you do well in terms of teaching in the OR?* and (3) *What do you feel you struggle with in terms of teaching in the OR?* The reviewer records their answers collected during the debrief sessions and then reviews what she observed to be effective and raises their awareness of where they could be more effective. The assessment tool that the expert reviewer completed is subsequently shared with the faculty members to identify for them what the optimal teaching behaviors are for teaching in the OR and how they were rated on those behaviors. The reviewer encourages the faculty to include the form in their teaching dossier for promotion and tenure. If the reviewer gauges that the faculty member is not pressed for time and fully engaged in the discussion, she will then attempt to ask some cognitive coaching questions,[3,11] particularly in relation to what the faculty member identifies as to what they struggle with. For example, when a faculty member feels like they don't communicate effectively, the reviewer may ask the faculty member, "*At what times during any of your teaching interactions do you feel like you do communicate well*? Or *What is getting in the way for you to communicate the way you want to*? The debrief meeting ends with the reviewer giving the faculty a hard copy of Roberts et al.'s article[12] on the BID model to utilize as a resource going forward.

2.6. Identify a peer evaluation instrument

We did not identify any peer review of operative teaching assessment forms after a literature search so the decision was made to develop a peer assessment instrument as part of our process. Our instrument is proving to be very educational for faculty since it concisely identifies optimal operative teaching behaviors and can serve as a springboard from which the reviewer can further coach.

2.7. Initiate training

Currently our process utilizes a single, well-trained reviewer however, this step will soon be developed and implemented as we recruit additional reviewers.

To develop our operative teaching assessment tool, both an Ovid and MedEdPortal literature search were conducted in May of 2018 using the MeSH keywords: *peer review; peer assessment, surgery, teaching, operative tool*. Operative teaching behaviors identified in the articles from the literature search were used to design a first draft of an assessment tool.[12–15] The draft was then presented to our surgery education research team in which 4 expert surgeons with national recognition for educational research were present to review and give feedback on the organization, content, terminology, and clarity of the instrument. Two additional articles were suggested to be incorporated.[16,17] Utilizing the feedback from the consensus group, a second draft was developed and brought back to the expert surgeon group for approval. A few edits were made before the peer review of teaching assessment tool was finalized and ready to be pilot tested by the program leader.

3. Results

Thirty-nine operative teaching assessments have been conducted by the program leader in the last three years with close to a third having incorporated the new operative teaching assessment tool presented in this article. Prior to development of the operative tool, a peer assessment letter identifying strengths and areas of

improvement was given to faculty as feedback [See Appendix A for an example].

There were several themes to the answers that faculty provided for the questions asked at the beginning of each debrief meeting. For "*What do you feel you do well with in terms of teaching in the OR*?" most responses from faculty indicated that they do well with allowing for independent action, showing different technique styles, thinking out loud, getting residents to identify next steps, teaching more basic information, involving all learners, or demonstrating certain behaviors that create a positive learning environment [Table 1]. For "*What do you feel you struggle with in terms of teaching in the OR*?" the most frequent challenges mentioned were: allowing residents to struggle/give autonomy, judging when to take over the case, communicating effectively, being patient, balancing education and patient safety, and giving feedback [Table 2]. For "*Did this operative case represent a typical teaching interaction for you*?" few faculty admitted that the presence of the expert reviewer significantly influenced their teaching performance that day. The majority indicated that they were cognizant of the reviewer for the first few minutes of the case but as the procedure progressed, they were not as cognizant and performed per usual.

Our peer teaching assessment instrument can be found in Appendix B. It divides effective operative teaching behaviors under the sections of Set/Briefing, Dialogue/Teaching, and Closure/Debriefing. Set/Briefing identifies behaviors related to preparation and operative goal setting. The Dialogue/Teaching section contains teaching behaviors that focus largely on specific teaching to defined goals, enhancing performance, and avoiding cognitive overload. Closure/Debriefing identifies behaviors related to trainee self-reflection, feedback, and take home messages. Our tool was designed primarily for resident intraoperative teaching but recognizing the importance of involving and educating students, we placed a section at the end to rate and comment on student interaction when applicable. Rather than the more traditional Likert scale, we chose a more objective rating scale for each teaching behavior that consists of Not Applicable (NA), Not Done (1), Done (2), and Done Well (3) with behavior frequency distinguishing Done from Done Well. A comment section is provided under each section for the reviewer to elaborate on their observations. Preliminary findings from the pilot testing of the assessment tool, revealed 4 pre-operative and intra-operative teaching behaviors that were often not observed. Those 4 behaviors were (1) asked trainee what he/she wants to work on during case, (2) focused teaching on trainee's pre-defined goal(s), (3) asked trainee to verbalize intraoperative steps/plan of procedure, (4) discussed evidence/scientific information relevant to case. Often, the post-operative behaviors were not observed due to the length of the case but the times when the entirety of the case was observed, most of the closure/debriefing teaching behaviors were neglected or just not demonstrated at the time the observer was present.

In terms of program effectiveness, several outcomes have occurred that warrant our peer review of teaching process to be continued. First, in the last 2 years, every faculty pursuing promotion has received at least one peer teaching assessment to augment the teaching portion of their dossiers whereas prior to this program, very few faculty took the initiative to seek out peer review of teaching and submitted their dossiers without one. Second, having peer review of teaching be a formal part of our faculty development program has been a unique recruiting tool, as faculty candidates have remarked favorably about the value of such a resource. Third, when the reviewer has the opportunity to review faculty on multiple occasions over time, she has often observed faculty deliberately incorporate or improve behaviors from the instrument discussed in the debrief meetings. Finally, one of our division chairs who recently underwent a peer review of teaching found the process to be so valuable that he is considering having each of his 7 faculty undergo a review annually.

4. Discussion

While faculty interact with learners differently and each operative case has its own intricacies, the literature suggests that there are behaviors that occur pre-operatively, intra-operatively and

Table 1
Themes and representative faculty responses to question: "*What do you feel you do well with in terms of teaching in the OR?*"

Theme	Representative Faculty Responses
Allow for independent action	*"I have become better at pointing out what I would do, but then accept what the learner's plan is for the patient as long as it isn't detrimental to the patient."*
	"I feel like I am good at getting learners to be independent. I will often leave the room so that I am not sitting beside the resident. When a surgery can be viewed on the monitor, I will often stand in the corner and watch and chime in when necessary. I am a big believer in learning by struggling so allow the resident to struggle within patient safety confines."
Show different technique styles	*"I show residents different ways of doing things and coach them to find their way of doing a procedure once they graduate."*
	"I do things differently than some of the IU faculty and so I enjoy teaching the residents, fellows, and students how to do things a different way (i.e. use an endo loop vs. a staple)."
Think out loud	*"I feel like I say what I am doing out loud a lot as I feel it is important for learners to hear my thought process, know about decision making, how to approach a patient in clinic and post operatively, etc."*
	"I talk through the case constantly … thinking out loud my thought process so that everyone can know what I am thinking and what the plan is. Scrub techs appreciate that too I am told."
Get residents to identify next steps	*"I ask the learner about next steps to really get them to think about independently doing the case."*
	"I engage residents well through discussion, thoughts, asking them questions like what is your next step? what is your goal with your next move?"
Teach basic information	*"I feel like I teach the basic stuff well (i.e. the anatomy, where to cut, how to cut, etc.)"*
	"I find it easier to teach factual information in the OR like anatomy, indications, why they are there, etc."
Involve all learners	*"I feel like I am good at involving the inexperienced learner as to what is going on either by having them feel the anatomy or ask them questions or get their hand in. I try to maximize the closing time to ask learners questions about the case, how to follow the patient, etc."*
	"I believe I do well with involving the students and residents throughout the entire case … pointing out anatomy, physiology, decision making, etc. I also ask questions in graded fashion after I get an idea of where their knowledge base is."
Create a positive learning environment	*"I try to make a non-punitive learning environment. I also try to make complex surgery easier for the residents to try and set them up for success."*
	"I provide a low stress environment for the learners and try not to make the learners feel super nervous at any time."
	"I feel like my greatest strength is still remembering what it is like to be a resident and relaying stories about my fears, experiences, vulnerabilities, mistakes, etc. back to residents because none of that was given to me."
	"I try and make the environment comfortable for teaching. I will feed the learners answers more when I can tell their knowledge base isn't there and when learners do have knowledge, I will let them struggle a bit when I ask them questions."

Table 2
Themes and representative faculty responses to question: "*What do you feel you struggle with in terms of teaching in the OR?*"

Theme	Representative Faculty Responses
Allow residents to struggle/give autonomy	*"I have a hard time letting residents struggle. I have a high standard of care and insist on making the surgery beautiful and elegant and have a hard time accepting mediocrity when it comes to my patients. I feel like the interns are relieved when I jump in or take over."* *"Because of the breadth of learners and the fact that I have very little continuity with them, it's challenging for me to give more autonomy to residents."* *"I struggle with giving residents autonomy in the OR. I often have back to back cases and then meetings and just feel pressure to get started on time at each hospital to then get to my meetings and everyone else on time. This leads to me doing most of the cases myself or giving limited time for autonomy and teaching."* *"I am still young and feel the need to do more especially when residents are struggling or not at a level that I can give complete autonomy. I do let the residents struggle more with open cases but don't want to risk patient safety and anesthesia being angry with prolonging a case."*
Judging when to take over	*"I struggle a bit as to when to take over with more junior residents when I forecast a possible injury that would not be safe."* *"I find it challenging to not have control, especially with the hard parts of an operation. I usually have a threshold of a 1-h time frame for giving a resident time to do an anastomosis, for example."*
Communicate effectively	*"Sometimes I find it challenging to move the case forward, especially when it gets hard to describe what needs to be done laparoscopically. I wish I could express things really well as to what I want the learners to do."* *"I feel like I demonstrate things better than I explain things so I struggle with conveying my thoughts well so that the resident understands what to do."*
Being patient	*"I like to move so I struggle with being patient."* *"I struggle with being patient. I recognize that this isn't the most efficient place and coupling that with having residents perform can make for long days."* *"Being patient with regard to the technical aspect. I have time demands … I look at the clock when I have meetings and determine how much time I can give to let the resident struggle."*
Balancing education and patient safety	*"I struggle with balancing education/training with being efficient for RVU and hospital sake … it's challenging to balance patient outcomes with training."* *"I am fundamentally challenged by the fact that education is really not compatible with patient safety and I have to constantly make judgment calls as to prioritize education or patient safety."*
Giving feedback	*"I need to be better at debriefing with learners."* *"I feel like I struggle at giving feedback especially when its feedback to a weak resident with whom I am annoyed by their performance."*
Other responses that were not mentioned more than once to make a theme	- *"I expend most of my effort on resident teaching and can forget that medical students are there."* - "Residents coming to do the case with a different way of doing things and not doing it my way." - "I struggle with getting engaged with learners." - "I feel like I do not shine as an educator when a case becomes really difficult because I just fall into my own thoughts and teaching shuts off." - "I over-talk. I am conscientious of it and know to some extent that it isn't the best practice to have for residents to focus but I still do it." - "I still need to find a way to engage the fellow more … to find more 'fellow questions' to help the fellow improve and stretch their growth." - "I find it hard to teach more esoteric things in the OR as well as have more in-depth conversations about things with learners." - "I also struggle with knowing how to bring a good student to the next level because essentially I only do 3 types of cases and it can get boring for students. I want to challenge the good students and wish I could do that more." - "I find it extremely challenging working on complex cases where it is technically challenging and the team is not 100% invested or capable." - "I find it challenging during complex cases to deal with people "in-training" like the scrub nurse in-training today." I also struggle at the end of the year when a chief is about to graduate and I feel like I don't have anything left to teach them so I just share my way of dong things for them to consider."

post-operatively that enhance learning.[18] The pilot phase results of using our peer review of operative teaching instrument indicated that faculty were inherently demonstrating most of the pre-operative and intra-operative teaching behaviors, with the exception of a few behaviors. Faculty rarely asked residents before the case what the resident specifically wanted to work on which then led the faculty to not focus teaching on trainee's pre-defined goals. Asking trainees to verbalize intraoperative steps/plan of procedure was also demonstrated less frequently. These three behaviors relate to encouraging trainees to show accountability for their learning which may be a skill that faculty don't recognize as being important to foster or valuable enough to incorporate into their teaching regiment. In Timberlake et al.'s systematic review of intraoperative teaching, the BID model[12] was reported to be the premiere structured model for developing best practices for the briefing, intra-operative and debriefing phases of interaction. While the briefing phase is the first portion of the BID model and integral to the following 2 phases, Timberlake et al. noted that there are no studies that formally examine best practices associated with the briefing phase which likely suggests that faculty, like ours, struggle most with operative goal setting for each case.[18] A fourth behavior that was also not observed regularly was discussing evidence/scientific information relevant to the case. When this behavior was demonstrated, it typically was done not intra-operatively but more pre-operatively while the patient was being prepped. This could also be a behavior that faculty tend to incorporate with learners prior to the OR when the observer isn't present. When the completion of the case was observed, our data indicated that most closure/debrief teaching behaviors were not performed, at least not while the reviewer was present. In the BID model, Roberts et all suggest using the closing time to debrief and provide immediate and specific feedback to the learner as well as provide guidance for future practice.[12] Again, this was not routinely observed which makes the habit of completing intraoperative assessments (i.e. SIMPL[19,20]) a necessity for residents to learn how they performed overall with the critical portions of the case and what they might need to improve on for next time. In our process, these omissions in teaching behaviors are singled out with each faculty by the reviewer with the intent of making faculty aware of the behaviors and to consider incorporating them into their teaching routine.

A critical feature of our peer assessment process is the post observation meeting whereby faculty have the opportunity to self-reflect on their teaching performance during the case. Having faculty identify what they struggle with in terms of teaching in the OR was particularly important to learn so that it could inform how we can enhance our faculty development curriculum. The two most common behaviors faculty identified as being challenging were being patient and letting residents struggle/give autonomy. More junior faculty struggled with giving residents autonomy because they lacked the confidence in their skill level whereas more experienced faculty had more demands on their time due to leadership roles and/or high case volume expectations and lacked patience to allow residents to struggle. Our findings were consistent with the work of Chen et al. as they identified numerous personal and contextual factors that affect surgical faculty's motivations for granting more autonomy to residents.[21–23] As a result of our data, last year we enriched our junior faculty development session on clinical teaching strategies with guidance from an expert surgeon on giving residents autonomy. This included recommendations such as minimizing cueing of residents, use of the BID model, insistence on learner preparation, longer senior resident rotations (apprenticeships), and inclusion of autonomy in operative assessment.[24]

As with any study, there were several limitations. Our peer review of operative teaching process was created and implemented at a single institution in a department of surgery with 7 divisions. There is currently 1 expert peer reviewer and the inter-rater reliability of the peer assessment instrument has not been conducted. To overcome these limitations, the peer review process is expanding outside the department of surgery into other surgical departments and additional faculty are being recruited to become trained surgeon reviewers. Finally, while our approach was qualitative using reviewer summary rather than formal qualitative analysis, the more important aspect of the work is creation of a methodology for formal peer review of faculty OR teaching which is of critical need.

In summary, our peer review of operative teaching program, which includes a comprehensive operative assessment tool, is systematic, feasible, and can be adopted by other surgical departments. Nearly all surgeons were receptive to being observed and were engaged to reflect on teaching best practices during the debrief meetings. Their identified strengths and challenges have been subsequently incorporated into our professional development curricula. The operative teaching behaviors that comprise the piloted operative assessment instrument served to increase awareness for the faculty as to what behaviors to strive for in future teaching engagements. Additionally, compliance for having peer assessment be a component to each faculty's promotion and tenure dossier significantly increased.

Appendix A

Peer Assessment of Teaching

Faculty: M.C., MD

Evaluator: Laura Torbeck, PhD, Vice Chair of Professional Development

Date: October 13, 2016

Learning Environment: OR

It was a pleasure to observe Dr. C operate with a resident (Nikki) this morning. I observed for a little over 2 h. The case got started on time but the resident was late to the case due to conference so I was able to observe M operate independently and actually teach and work with the scrub techs.

When I observe faculty performing in the OR, I like to structure my feedback using the operating room teaching behaviors in a resident-based assessment system reported in Cox and Swanson's 2002 article in *The American Journal of Surgery* (183; 251–255).

- *Describes upcoming surgical procedure, including operative approach, rationale, and alternatives* – The resident walked in right as the patient was being prepped on her back side. M used a couple markers to draw out the anatomy on the patient's back for the resident to better visualize the landmarks and the "surgical box" that they were going after. She directed the resident to make some markings on the patient's front side. M and the resident talked through in collegial fashion how to make the incision so as to best optimize closure.
- *Discusses expected patient outcomes and possible complications* – I observed M do this directly and indirectly at times. For example, she forecasted for the resident several times when she would run into a lumbar perforator and then how to manage the bleed quickly. M differentiated at times the kind of dissection they were doing for that case vs a breast reduction. During her coaching dialogue, M indirectly educated on outcomes and complications.
- *Clarifies resident roles and responsibilities* – I did not observe this in a formal fashion … the resident just stepped in right away and it seemed like both M and the resident knew in some unspoken way what role the resident would take on for the portion of the case I observed!?
- *Demonstrates technical skills with confidence and expertise* – I observed M demonstrate her technical skills with great confidence and expertise. M's biggest strength that I observed was her constant coaching and forecasting of knowledge that she did while the resident was dissecting. M first-assisted pretty much the whole time I observed and to fill in the time/silence, she emphasized landmarks, encouraged the resident to visualize the "surgical box," cautioned for perforators, identified different ways to bevel out and cauterize, and coached on how to have better retraction. M explained that she likes to be systematic and always does it in 1,2,3,4 order whereas others vary it up a bit depending on the tissue planes at the time … one approach isn't better than the other, she stated. When it was time to jump in and speed things up, M would demonstrate better approaches to dissecting/cauterizing for the resident.
- *Permits resident participation in procedures according to ability* – For the whole time that I observed, M performed mostly in *Passive Help* … allowing the resident to lead the dissection while still coaching. I imagine the guidance level may have changed periodically as the case continued but from what I observed, M gave the resident a high level of autonomy.
- *Demonstrates awareness and sensitivity to resident learning needs* – M created an inviting, collegial environment for the resident to operate and be coached. After scrubbing, I did overhear the resident talking with M as to what she would like to focus on either during this case or the next. (close reduction)
- *Answers questions clearly and precisely* – the resident intermittedly asked questions during the case and the dialogue was quite engaging.
- *Stimulates residents to think critically and problem solve* – I did not observe this very much as M was mainly focused on coaching the resident through the dissection efficiently and effectively.
- *Provides direct and ongoing feedback regarding resident progress* – I observed this to be a strength of M's. M would allow the resident to make progress, check her progress, and then comment/guide. This continued for the whole time I observed and it was done very professionally.
- *Maintains climate of mutual respect for all members of health care team* – I observed that M had a very good, collegial rapport with

the entire health care team in the OR. She was very approachable and took interest in chatting with the scrub techs.

While this was a "one time" observation, my impressions of Dr. C's interpersonal and communication skills as well as her teaching abilities are favorable.

Areas of improvement: It seemed like a couple times the resident may have benefitted from switching positions with M to get a better angle for dissection … perhaps the resident should have spoken up and asked to switch but perhaps M could also have checked-in with the resident to see if positioning was optimal for her!? I did not observe M ask the resident what she wanted to focus on during this case, unless I missed it when she and the resident were scrubbing!? I do encourage M to use the BID model (see attached article) for engaging residents, students and fellows, especially with residents and fellows as they should be identifying what they need to work on and inform the attending what they need focus on to strengthen their skills. I also attached another intraoperative teaching model that I encourage M to try out once or twice during each case. Finally, I encourage M to be cognizant of the Zwisch scale [*Show and Tell, Active Help, Passive Help, Supervision Only*] and how much guidance she plans on giving to learners to improve resident autonomy.

Appendix B

Intraoperative Teaching Assessment Form
Person Receiving Feedback: _____ Date: _____
Reviewer: _____

A premise of trainee (resident or fellow) intraoperative instruction is that a structured model is needed. A suggested model includes: Set/Briefing → Dialogue/Specific Teaching → Closure/Debriefing.

*Preparation (use wait time during patient prep to review pt case, images, set roles).
*Operative goal setting for trainee.
Comments:

NA - not applicable	1 – Not Done	2 – Done [1–2 times, did briefly]	3 – Done Well [2 > times, did in detail]

*Specific teaching on pre-defined trainee goals.
*Performance enhancing instruction.
*Avoid cognitive overload (dual-task interference).

Teaching behavior	NA	1	2	3
Used wait time prior to start of case to interact with learners (review pt case, images, set roles, etc.)				
Asked trainee what he/she wants to work on during case (helps trainee identify a goal) [BID model]				

Comments:
*Trainee self-reflection.
*Performance enhancing instruction.
*Take-home messages.

Teaching behavior	NA	1	2	3
Role modeled effective time out				
Demonstrated a positive attitude toward teaching				
Focused teaching on trainee's pre-defined goal(s)				
Stimulated trainee to think critically and problem solve				
Emphasized anatomical landmarks				
Asked trainee to verbalize intraoperative steps/plan of procedure				
Frequently "thought out loud" for learner(s) to understand rationale/decision making				
Discussed evidence/scientific information relevant to case				
Modified cueing appropriate for trainee level (autonomy)				
When trainee failed to progress, attending prompted trainee to pause and identify the problem. Attending then informed trainee about the problem, what needed to be done to proceed, checked trainee's understanding, and judged capability of trainee to proceed.				
Provided direct and ongoing feedback regarding trainee progress				
Answered questions clearly and precisely				
Maintained a calm and courteous demeanor under stress				
Explained reason(s) why attending took over the case				
Explained technical errors/complications				
Engaged multi-level residents effectively				
Maintained a climate of mutual respect for all members of health care team				

Comments:
STUDENT INTERACTION.
Comments:

Teaching behavior	NA	1	2	3
Prior to or during closing, asked for trainee self-reflection on pre-defined learning goal(s)				
Prior to or during closing, summarized for the trainee performance feedback specifically on the trainee's pre-defined learning goal(s)				
Gave the trainee an action plan for next time				
Reminded resident to submit a SIMPL self-assessment				
Checked trainee understanding of postoperative management				

References

Teaching behavior	NA	1	2	3
Acknowledged student's presence (knew their name)				
Demonstrated respect for patient				
Assured a good view of operative field				
Discussed rationale for the surgical intervention				
Reviewed normal anatomy in the operative field				
Discussed abnormal anatomic findings				
Allowed student to "feel" pathology				
Discussed potential postoperative complications				
Discussed post-operative follow up after discharge				
Answered questions clearly				

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