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Major Contributions

Exploring the nature and focus of feedback when using video playback in gynecology laparoscopy training

Exploration de la nature et de l'objectif des rétroactions données lors du visionnement de vidéos dans le cadre d'un cours sur la laparoscopie en gynécologie

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Abstract

Background: Feedback about intraoperative performance remains a cornerstone of surgical training. Video playback offers one potential method for more effective feedback to surgical residents. More research is needed to better understand this method. This study explores the nature of instructional interactions and feedback in the operating room (OR) and when using video playback during post-operative review in obstetrics and gynecology (OBGYN) training.

Method: This case study occurred between September 2016 and February 2017. Three OBGYN residents and five OBGYN supervising surgeons were involved in six laparoscopic cases. Intraoperative and video playback dialogues were recorded and analysed, the former deductively using codes identified from published literature, and the latter both deductively, using the same codes, and inductively, with codes that emerged from the data during analysis.

Results: 1090 intraoperative interactions were identified within 376 minutes of dialogue. Most interactions were didactic, instructing the resident how to use an instrument to perform a task. Deductive analysis of postoperative video playback review identified 146 interactions within 155 minutes. While the most common interaction type remained didactic, a teaching component was included more often. It became apparent that deductive analysis using the intraoperative codes did not adequately capture the nature and focus of feedback during video playback. Hermeneutic phenomenological analysis identified more dialogic video playback sessions with more resident-initiated questions and reflection.

Conclusions: This study demonstrates that the nature of feedback during video playback is fundamentally different from that in the OR, offering a greater potential for collaborative and improved learning.

Résumé

Contexte : La rétroaction sur la performance peropératoire demeure la pierre angulaire de la formation chirurgicale. Le visionnement de vidéos est un moyen d'offrir une rétroaction plus efficace aux résidents en chirurgie. Des recherches supplémentaires sont nécessaires pour mieux cerner cette méthode. La présente étude explore la nature des interactions pédagogiques et de la rétroaction donnée en salle d'opération et lors du visionnement de vidéos au cours de l'analyse postopératoire dans le cadre de la formation en obstétrique et gynécologie.

Méthode : Cette étude de cas a été réalisée entre septembre 2016 et février 2017. Trois résidents et cinq chirurgiens superviseurs en obstétrique et gynécologie ont participé à six interventions laparoscopiques. Les dialogues peropératoires et les échanges qui ont eu lieu lors du visionnement des vidéos ont été enregistrés et analysés, les premiers de manière déductive en utilisant les codes tirés de la littérature, et les seconds à la fois de manière déductive, en utilisant les mêmes codes, et inductive, à l'aide de codes dégagés des données pendant l'analyse.

Résultats : Les interactions peropératoires recensées au cours des 376 minutes de dialogue sont au nombre de 1090. La plupart des rétroactions étaient didactiques, visant à expliquer au résident comment utiliser un instrument pour effectuer une tâche. L'analyse déductive des vidéos postopératoires a permis le repérage de 146 interactions au cours d'une période de 155 minutes. Si la plupart de ces interactions demeuraient didactiques, elles comprenaient plus souvent une composante d'enseignement. Il s'est avéré que l'analyse déductive à l'aide des codes peropératoires ne rendait pas compte de manière adéquate de la nature et de l'objectif de la rétroaction offerte pendant le visionnement des vidéos. L'analyse phénoménologique herméneutique a permis d'identifier des séances de visionnement qui étaient plus dialogiques, comprenant davantage de questions et de réflexions provenant des résidents.

Conclusion : La présente étude montre que la rétroaction donnée pendant le visionnement des vidéos et celle donnée en salle d'opération sont fondamentalement différentes, et que la première favorise davantage que la seconde l'apprentissage collaboratif et son efficacité.

Introduction

Feedback is central to the process of learning.[1] Feedback is also known to play a foundational role in the postgraduate surgical education (PGSE) context.[2] Despite this recognized importance, surgical residents perceive a lack of regular high quality and timely feedback.[2,3,4] This lack of feedback is not only perceived by surgical residents but substantiated by direct observation of feedback processes in the operating room (OR). Ahmed and colleagues[5] observed that feedback was provided to residents in less than half of operative cases and was often of limited utility for future learning.

With the move to a competency-based medical educational (CBME) model in residency education, assessment has been promoted as a catalyst for learning[6] and the development of quality assessment and feedback processes remains at the forefront.[2,7] One possible solution to the current lack of high quality feedback in surgical education is exploring the use of video playback as a feedback tool.

Hattie and Timperley[8] suggest that the provision of cues and reinforcements within video feedback make it one of the most effective forms of feedback. These cues relate to goals by helping learners identify their current level of performance and strategize how to achieve greater competency in the task (feedforward processes).[8] Video playback also promotes consistency in acquired behaviours.[8,9] These feedback qualities have been linked with learners' growth of adaptive behaviour, ability to transfer skills, and motivation.[9]

Several studies have demonstrated that the use of video playback with verbal or written feedback at the time of video review significantly improves technical skills and reduces technical errors when compared with verbal or written feedback alone, or standard feedback practices (which would include intraoperative or postoperative verbal feedback).[10-15] Specifically, improvements were seen in overall procedure scores and instrument and tissue handling. In one study, as resident progressed through several rounds of video-based debrief and reflection, the coaching sessions became less directive and resident self-assessment scores became more strongly correlated with expert assessment scores.[15]

In summary, there is some evidence to support the use of video playback in surgical training. These studies, however, all provided a structured coaching format for supervisors to follow while using the video playback with learners. Research is needed to better understand the specific influence of video playback upon the nature and focus of feedback between teachers and learners without any provision of a coaching structure. A better grasp on the interplay between video playback and verbal feedback in a more natural teaching environment will aid in optimally leveraging this tool in surgical education. Therefore, the purpose of this study is to explore the nature and focus of dialogue between resident and supervising surgeons intraoperatively and while using video playback.

Methods

The data and results presented in this article are a subset of a larger qualitative Case Study[18] which was defined by its subject and its object (a departure from the more common identification of boundaries in qualitative Case Studies as described by Yin[17]). The subjects of the case were the obstetrics and gynecology (OBGYN) attending surgeons and surgical residents within the institution in study, and the object of the case was the feedback process for improvement in laparoscopic surgical skill when video playback was used. Study participants were members of the OBGYN department at a mid-sized institution in an academic hospital setting. Data was collected between September 2016 and February 2017. This article presents the first set of data which explored the nature of dialogue between residents and supervising surgeons intraoperatively and while using video playback. The following provides details pertinent to this subset of data from the larger study.

Three OBGYN residents were recruited on clinical rotations in which there was a higher likelihood of performing laparoscopic surgery. Because of rotation schedules and their timing within a five- year residency program, the final recruited residents were in postgraduate years 2, 3 and 5. Since the OBGYN residents performed operations under the supervision of an attending surgeon, each attending surgeon working with the recruited residents during these surgical cases was also recruited.

Data collected included audio and video recordings of the laparoscopic procedure, post-procedure written responses, and audio recordings of the post-operative video review. It was the experience of the primary author (JH) that standard feedback practice on surgical performance at the institution under study primarily included informal intraoperative instruction and feedback. The additional post-procedure written responses and post-operative video review were added for this study.

Ethics and consent

All supervising surgeons and residents in the OBGYN department at this institution were made aware of the study and were free to opt out of participation at any time. A letter of information was given to each participant and informed consent from the surgical resident and supervising surgeon were obtained prior to participation. Informed consent was also requested from the patient because the intraoperative audio and video recordings were to be used solely for the purpose of education and research, as opposed to patient care and medical documentation. Participants were not remunerated for their time.

Ethics board approval from the Health Sciences Research Ethics Board was obtained (study number: 6019296). Audio recording equipment was funded by Social Sciences and Humanities Research Council – Canadian Graduate Scholarship grant obtained by the researcher.

Data collection and analysis

Postoperative questionnaires

Immediately following the procedure, the resident and supervising surgeon were handed a postoperative questionnaire and asked to write their responses. The primary purpose of these questionnaires was to document procedural steps done well by the resident and those requiring improvement. These two moments were those selected to be reviewed on video. If there was discordance between the supervising surgeon's and resident's opinions, they discussed and decided upon one moment done well and one moment requiring improvement that they would review on the video.

Intraoperative dialogue

The intraoperative dialogue was recorded and transcribed. Initial analysis was completed using a deductive content analysis approach based on themes from the reviewed literature on intraoperative feedback.[19] The themes were grouped based on similar content and labelled with codes (named *a priori* codes). The *a priori* codes are listed in Appendix A. These codes were then deductively applied to the intraoperative dialogue to ensure similar interactions were occurring at the institution under study when compared with previously published observations of interactions in the OR. Interactions were defined as any verbal communication between the supervising surgeon and resident.

A *de novo* code was named when an intraoperative interaction between a supervising surgeon and surgical resident did not match any of the *a priori* codes. This interaction was then labeled with a *de novo* code, and any interactions that later matched this *de novo* code were labelled as such. There were four *de novo* codes that were named as follows: distractions, probing, specific praise, and confirmation related to instrumental with teaching communication. These codes are described in Table 1.

Table 1. Description of De Novo codes

Code	Description
Distractions	This code captured extraneous things that happened in the OR that were captured on the recording. Examples include a phone ringing, a pager going off or another health care worker asking a question that distracted the supervising surgeon and resident from the surgery.
Probing	Probing describes the act of a supervising surgeon asking the resident questions around the case and the steps of the case, while the resident is operating.
Specific praise	Praise given by the supervising surgeon that was explicitly anchored to a resident's performance. This was in contrast to non-specific praise, which was one of the pre-existing codes.
Confirmation related to Instrumental + Teaching Communication	A supervising surgeon's verbal confirmation that the resident was performing a step correctly immediately after that supervising surgeon had instructed the resident on how to perform the step

Note. Description of de novo codes identified in the operating room communication in this study but not previously described in the literature.

Video playback dialogues

All video playback sessions were completed within one week of the surgery. All resident and supervising surgeon pairs reviewed the two previously identified procedural steps together. In advance of the session, the primary author reviewed the videos to identify the time points during which those procedural steps occurred and provide those time points to the participants to facilitate finding the segment of video to review. The resident and supervising surgeon were provided with basic instructions on how to start and stop the surgical video, how to speak into the recording device, and were prompted to discuss the performance seen on the video. If the resident and supervising surgeon wished to review more of the video, they were made aware that they were free to do so. The primary author was present only to set up the technology and left during the video playback.

The dialogues from the video playback sessions were then transcribed and analyzed using a deductive content analysis with the same *a priori* codes as with the Interoperative Dialogue. The *de novo* codes were not included in this analysis as we only wanted to apply codes on feedback styles seen more broadly in previous literature. This deductive analysis of the video playback dialogues was performed in order to assess if the nature and content of the conversations in this new context were the same or different as those in the OR.

To better capture the nature of the interactions between resident and supervising surgeon during video playback, hermeneutic phenomenological analysis was chosen as the second method of analysis.[20] While typically in phenomenological analysis, a researcher's pre-existing knowledge and background is bracketed[21] (identified, made known, and then held to the side in one's mind) to reduce the effect of personal experience bias as much as possible during analysis, hermeneutic phenomenological analysis *relies* on the researcher's knowledge pertinent to the study context.[20] Given the author's background as an OBGYN resident, and perspective as a surgical learner, this analytic approach provided a greater depth of understanding of the interactions during video playback. In particular, it allowed for a better appreciation of the nature of feedback, as opposed to just the raw content of feedback that occurred at the time of video review.

Each video playback session dialogue was analyzed independently. The first author (JH) began with review of the written transcripts to get a first impression of the nature and focus of the conversation. Notes about the author's impressions were written directly on the transcript and saved for future use. The author then listened to the video playback dialogues several times to become very familiar with them and then, integrating the notes from the transcript, wrote a narrative response (typically one-half page in length) to reflect and summarize the nature and focus of the video playback interactions. The audio recording and transcripts were again reviewed, while edits to the narrative responses were made and supporting quotations added, to ultimately capture and illuminate the nature and focus of the interactions. While the narrative responses could stand on their own, descriptive themes became apparent and clearly emerged from the narratives. In the context of the larger study and to assist in a convergence of all analytic results, an inductive analytic pass[22] was performed upon the narrative responses that had emerged from the hermeneutic analytic work.

Results

Deductive analysis of the intraoperative and video playback verbal interactions

Review of all intraoperative dialogue yielded 1195 interactions (Table 2) in the 376 audio recorded minutes of the six operative cases. The *a priori* codes from the literature captured 1095 interactions. The remaining 105 interactions were captured by the *de novo* codes.

Table 2. Results from deductive analysis of intraoperative interactions

Codes from the Literature		Total in all cases	without *de novo* codes	with *de novo* codes
			Percentage*	
Instrumental	Didactic	525	48	44
	Corrective	120	11	10
	Two-way	96	9	8
Pure Teaching	Didactic	63	6	5
	Corrective	4	0.4	0.3
	Two-way	1	0.1	0.1
Instrumental +	Didactic	119	11	10
Teaching	Corrective	35	3	3
	Two-way	6	0.6	0.5
Banter		15	1	1
Non-specific Praise		82	8	7
Conflicting Educational Commitments		21	2	2
Narrative Stories		3	0.3	0.3
Total deductive		1090		
De *Novo Codes*				
Distractions		10	N/A	0.8
Probing		24	N/A	2
Specific Praise		1	N/A	0.1
Confirmation related to Instrumental + Teaching communication		70	N/A	6
Total *de novo*		105	N/A	9
Total		1195		

Note. Results from deductive analysis of intraoperative interactions between the supervising surgeons and surgical residents. This table outlines the raw totals and percentages of these interactions. The raw totals and recalculation of percentages including the de novo codes identified in the data are also presented. *Percentages are rounded to the nearest whole number except if the number was less than 1.

Most interactions (44%) were instrumental didactic. This describes an interaction in which the supervising surgeon is intentionally instructing a resident on how to use a surgical instrument to perform a procedural step. Less commonly seen were instrumental corrective interactions (describing an interaction in which the supervising surgeon corrected the resident on how to use an instrument to perform a task when they were previously using the instrument or performing the task improperly) and instrumental didactic with a teaching component (10% and

10% respectively). When the interaction included a teaching component it contained information or teaching relevant to the case, but outside the technically necessary information on how to complete a task. For example, an explanation on why a procedural step needs to be performed a certain way or teaching on relevant anatomy. Only 25% of interactions in the OR contained a teaching component.

Of the 105 interactions captured by the *de novo* codes, 67% were supervising surgeon confirmations of a correct or incorrect performance following an instrumental teaching interaction. This type of comment provided immediate feedback to the resident that they were performing the instructed skill appropriately or inappropriately. The other types of interactions – distractions, probing and specific praise – made up 10%, 23% and 1% of *de novo* interactions respectively.

Video playback identified 152 interactions that matched the *a priori* codes, in 155 minutes of video playback (Table 3). There were no instrumental nor instrumental with teaching interactions identified. Most interactions were pure teaching didactic, followed by non-specific praise and pure teaching corrective interactions (63%, 15%, and 18% respectively). Banter and narrative stories were the only other codes identified.

Table 3. Results from deductive analysis of interactions during video playback

Codes from the Literature		Total in all cases	Percentage*
Instrumental	Didactic	0	0
	Corrective	0	0
	Two-way	0	0
Pure Teaching	Didactic	95	63
	Corrective	22	15
	Two-way	0	0
Instrumental + Teaching	Didactics	0	0
	Corrective	0	0
	Two-way	0	0
Banter		1	0.7
Non-specific Praise		28	18
Conflicting Educational Commitments		0	
Narrative Stories		6	4
Total		152	

*Note. Results from deductive analysis of the interactions between supervising surgeons and surgical residents when using video playback. *Percentages are rounded to the nearest whole number except if the number was less than 1*

This analysis identified a clear difference between interactions in the OR and interactions during video playback. The task in the OR is performing surgery, therefore the heavy emphasis on instrumental interactions in this setting is necessary. Meanwhile, during video playback, the resident and supervising surgeon are no longer performing surgery, and therefore the need for instrumental interactions is eliminated and the emphasis shifts towards teaching. Because these two scenarios occur in two fundamentally different teaching and learning contexts, it became apparent that the same deductive codes could not be applied, and if used, their data frequency rates would be at or near zero. It is for this reason that an inductive analysis using hermeneutic phenomenological analysis of the video playback session dialogues was performed.

Themes from the hermeneutic analysis of the video playback session dialogues

There were six themes that emerged from the thematic analysis of the first author's hermeneutic narrative responses including comfortable discussion, professional improvement, enrichment of teaching points, prompting by the supervising surgeon, guiding by the supervising surgeon, and visual cues prompting reflection.

Comfortable discussion occurred between the resident and the supervising surgeon during the video playback session indicating an important level of reflection and respect for each other. There was no hesitancy by the residents to ask questions, request clarity about a comment or state their own reflection on their perception of their video performance. There were instances when the supervising surgeon reflected on their own performance to make a teaching point. In one conversation, the supervising surgeon identified that she was not providing optimal visualization with the laparoscopic camera. She identified this issue and was open about this with the resident. "So now, here, tell your camera person to follow you into the pelvis. Who was holding the camera here? Oh, was that me?" (followed by laughing from both Supervising Surgeon E and Resident 1). "If you're not happy with your view, be vocal about it, because if you're not seeing and you're not happy, then that's not an ideal situation to be operating in. You're the surgeon, so you can say, can you adjust the view a little bit, zoom in, zoom out, and I think that's very reasonable to be doing and I won't be offended at all." (again, laughter from both people) "…cause sometimes I'm thinking about one piece of the surgery and you're trying to do something else."

Professional improvement and enrichment of teaching points was evident in discussions that focused on improvement of performance and surgical skill, improving knowledge and understanding of surgical steps and

anatomy, and problem solving on improving surgical efficiency often for both the supervising surgeon and resident. While the two surgeons spoke, the visual cues in the video became a source of both resident and supervising surgeon reflection. "Can I just let go and maybe slide? I feel like that would have been better technique, when I'm watching myself now" (Resident 3); her statement of reflection being self-prompted and focused on improvement of technique.

Prompting and guiding commentary by the supervising surgeon appeared in three different ways: 1) from a resident prompt which triggered a direct teaching point or guidance to a teaching point by the supervising surgeon; 2) a supervising surgeon comment telling the resident a learning point based on something observed in the video; and 3) guiding commentary from the supervising surgeon as they guided a resident towards the teaching point being observing in the video. The dialogue below presents a common occurrence of the supervising surgeon guiding the resident to understand this particular technique.

> *Supervising Surgeon B: …see here, you're trying to grab it, and the problem with grabbing it is you can burn through your sutures as well…*
>
> *Resident 2: K.*
>
> *Supervising Surgeon B: So, the idea of just doing a surface thing. The other thing is, I don't think you have to burn until the music stops (referring to the sound on the tri-polar surgical device). I think when you're on an area like the bladder, or something where you don't want to burn to deep, you just do it…*
>
> *Resident 2: A buzz.*
>
> *Supervising Surgeon B: …till the bleeding stops.*
>
> *Resident 2: A buzz or two.*
>
> *Supervising Surgeon B: Ya, it doesn't take much. Well, like, literally one…*
>
> *Resident 2: Ok.*
>
> *Supervising Surgeon B: See, that stopped very quickly there once you gave it one little buzz.*

Another interesting example occurs when a resident's questions lead into a supervising surgeon teaching point. The resident (Resident 1) asked a question about a procedural step in anticipation of reviewing that step later in the video, "when you take the uterines vaginally, how do you decide how low to go laparoscopically?" When that step is reviewed, "well, I go to essentially just above the bladder flap, essentially, cause I don't develop the bladder flap (Supervising Surgeon A), the resident then demonstrates self-reflection and consolidation of the learning point she had previously asked about, "oh, you can see the bladder flap better here. OK. And we stopped right above it."

The visual cues provided by video playback prompted reflection by offering new perspectives on teaching points that arose during the procedure. In one instance, a resident recognized an instrument's proximity to nearby structures, saying "I'm a little close there" (Resident 3). The surgeon replied, recalling that this was discussed during the case, "Ya, ya. We talked about that during the case, right?" (Supervising Surgeon C). The resident also recalled the intraoperative discussion, then reflected on how the video review offered a new visual perspective on the teaching point, "and now, watching it I do (see it) too, cause I see it now…" The reflection is anchored to an accurate visual representation of what occurred intraoperatively, making this form of task level self-assessment more powerful.[8]

The visual cues also provided obvious anchors for praise on performance. Non-specific praise is traditionally a weaker form of feedback. While using video playback, however, non-specific praise was anchored to a visual cue which then made it innately task level feedback, rather than self level feedback.[8] For example, when Supervising Surgeon C says, "So this was good, I thought, you sort of hugged the ovary and tube well," they anchor the praise to the task being viewed on the video. While non-specific praise directed at the self level can dilute the impact of feedback and be detrimental to learning, praise directed at the effort or task, rather than at the self, can enhance self-efficacy and be leveraged towards improvement in performance.[8]

Discussion

Feedback about intraoperative performance is vitally important to surgical skills training in PGSE. It is well recognized that different forms of feedback have differing effect.[8] However, the impact of feedback is dependent, in part, upon the nature and focus of the feedback. This research highlights the fundamental differences in nature and focus of feedback in the OR and when using video playback, and the potential leverage this difference may have in optimizing surgical learning.

The conversational, dialogic nature of the feedback during video playback sessions suggested increased learner engagement as "a collaborative discussion about feedback

which enables shared understanding and subsequently provides opportunities for further development based on the exchange."[23] Active participation develops "a sense of agency and responsibility"[24] for the learner, in this case the resident, increasing the potential for engagement of the resident self-regulatory processes.

Feedback that provides the learner with cues or reinforcement is noted to have a large effect size in improving learner performance.[8] Additionally, the benefits of task-based feedback, particularly on completion of the task, rely upon accurate memories of how the task was performed.[8] Video playback provides accurate visual cues to the resident and supervising surgeon to anchor feedback, praise and reflection to the task or process level, while also adding strength to the task level feedback by ensuring an accurate recall of the performance. Any praise given during the video review was anchored to visual cues, making the praise directed at task or process level, and directed away from self level. This has the potential to both inform resident self-efficacy and equip the resident with tools to approach different, and perhaps more challenging tasks in the future.[8]

The interactions captured in the OR were in direct contrast to interactions during video playback. In the OR environment, feedback rarely became dialogic. It was mostly didactic or corrective in nature as found previously by Ahmed and colleagues.[5] Although didactic, corrective task level feedback can be powerful, such feedback is often not generalizable to future tasks. In addition, the non-specific praise style of feedback given in the OR can be detrimental to resident learning. Given with good intention by the supervising surgeon, often to boost surgical confidence, this kind of evaluative feedback does not explicitly identify the reasons for which the learner is receiving praise, can distract the learner from task or process level feedback, and can lead to poor performance[8]. During video playback, the emphasis shifted from performance to review, shifting the style of interaction from didactic and instrumental to dialogic and reflective.

There are several limitations of this study: limitation to laparoscopic cases, limitation to a single discipline at a single center, limitation to verbal communication techniques, and potential impact of the Hawthorne effect.[25] Laparoscopic cases were chosen to record and review because the laparoscopic equipment at the institution under study already had recording equipment attached to the laparoscopic cameras. This worked well for our study and given the limited literature exploring the use of video playback, the results still contribute positively to surgical education. Although the transferability of results to open procedures may be limited, minimally invasive techniques (including laparoscopy) are now the standard of care for most procedures across surgical specialties, so there may yet be broad applicability.

Only one surgical specialty, OBGYN, was chosen for this case study, to keep the scope of the Case Study subject narrow and clearly defined. The author believes, however, that the results of this study are transferable to other surgical specialties as the pressures of the OR learning environment remain similar across disciplines. The surgical education field would benefit from exploring these questions further within different surgical specialties.

The data collected and analysed reflected only verbal interactions and communications between the supervising surgeon and surgical resident in the OR and during video playback. The author acknowledges that there are likely many other non-verbal communication techniques used by supervising surgeons in the OR and during video playback, that are used to instruct and coach. These interactions certainly warrant further exploration and understanding but are beyond the scope of this case study.

Onwuegbuzie and Leech[25] discussed the potential impact of the Hawthorne effect on reactivity in qualitative research. The Hawthorne effect may be defined as the "impact of the researcher on the research subjects or setting, notably in changing their behavior."[26] Given the nature of many qualitative research methods, Hawthorne effect is an intrinsic challenge in these methods, with potential impact upon internal credibility. Efforts were taken within this study to minimize Hawthorne effect including the small size and light weight of the microphones in the OR, hopefully making them more easily forgotten, the researcher sitting out of sight in the OR, the researcher leaving the room while video playback occurred, and the use of hermeneutic analysis which requires the insight of a knowledgeable practitioner as researcher. In addition, the deductive analysis demonstrated similar communication styles in the OR compared with previous literature, which suggests the Hawthorne effect was minimized.

The results of this study highlight the importance of the learning environment when reflecting on the nature and focus of feedback in postgraduate surgical training. It may be postulated from these results that the didactic nature of feedback in the OR was necessary for patient safety,

correct surgical technique and procedural completion, and time constraints. Similarly, the residents' limited intraoperative dialogic interaction with supervising surgeon instructions and feedback may be secondary to cognitive processes uniquely influenced by the OR environment including, but not limited to, learner cognitive load, psychological safety, and time pressures. Although this reflection is outside the scope of this article, the fundamental differences in nature and focus of feedback when performing the surgery in the OR and when reviewing the same surgery on video outside of the OR suggest there are important environmental and cognitive influences upon surgical feedback that are worth further exploration.

From a practical implementation perspective, one perceived barrier may be the time burden of video playback review in an already time-stressed learning environment. However, this study suggests this tool has significant value in improving the quality of feedback and that is perhaps worth the time investment. Suggestions from the authors of this study include: investment in easy to use recording equipment, training OR nursing staff to start and stop the recording, demonstrating ease of use of the technology to residents and supervising surgeons who will be using it.

Additionally, one could consider junior residents reviewing cases with senior residents or residents using video playback independently to take some time burden away from busy surgical staff; although these are still avenues for future research at this point, rather than evidence-based recommendations. Additional future research could also explore the use of video playback in groups of residents, including exploration of the nature, focus and experience of using video playback for feedback in this context.

Conclusions

This study has helped develop an understanding of the nature and focus of feedback when using video playback in PGSE, helping to fill the gap in the current body of literature on this topic.

Video playback is a feedback tool that provides video-prompted reflective feedback opportunities on surgical performance with a focus on professional improvement and enrichment of teaching points. While intraoperative feedback can be focused on surgical technique, video playback during discussions outside of the stress of being in surgery is a tool that helps to facilitate discussion which captures many outstanding feedback qualities associated with performance improvement.

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Author's note: This paper is drawn from a larger MEd study, "Enhancing surgical education using video playback: A case study on the influence of video playback on the nature and experience of feedback between supervising surgeons and surgical residents." More detailed analyses and presentation of data can be found in the thesis. The first author of this paper was a resident member of the OBGYN Department at the institution under study in the time frame of this study. This aided in recruitment of participants. The first author's relationship with the participants in this study allowed for easy development of rapport and an in depth understanding of the context in which the participants were working.
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Appendix A. Summary of *A Priori* codes

Reference	Methods	Results	Codes used
Ahmed, M. et al., 2013[5]	Qualitative interviews and ethnographic observations of feedback/debriefing practice in the OR	Method/nature of feedback: Didactic Corrective comments Two-way dialogue → primarily learner ensuring good progress Content: Non-specific praise Technical skills (lack of feedback on other skills; communication, etc.) – often task specific negative feedback (whereas praise tends to be non-specific) Barriers: Case complexity → with more complex case, trainer more focused on success of case than feedback Competing educational commitments → revert to didactic teaching of medical student rather than technical feedback to trainee	Didactic Corrective Two-way Non-specific praise Competing Educational Commitments
Roberts NK. et al., 2012[27]	Grounded theory drawn from interactions in the OR	Broad categories of interactions: 1. Instrumental interactions Move operation forward without explicit reference to what the resident would learn from the interaction Residents serves as instrument through which supervising surgeon acts Straight forward, directive, without explanation 2. Pure teaching interactions Supervising surgeon provides enough context or explained his or her thought processes enough to add to the learner's knowledge or to shape the learner's surgical judgment Ex. Demonstration of techniques, explanation of physiologic conditions, allowing resident to 'feel pathology' Purpose: move learner's understanding forward, acquire knowledge to help their future performance 3. Instrumental + teaching interactions Moved operation forward but also included explanation or elaboration that made it more likely to guide future performance Task-focused element of the talk Substantive educational element 4. Banter Does not contribute explicitly to the function of teaching or the progress of the operation Creates a friendly environment for learning Commenting on operation without instrumental or teaching purpose Focus on something peripheral to operation	Instrumental Pure Teaching Instrumental + Teaching Banter
Hu YY. et al., 2012[28]	Qualitative analysis of narrative stories in the OR	Narrative stories 1. Practice changes from lessons learned Usually described parallel patients from which knowledge was gained and contributed to adjustments in management of patients/personnel. Not linked to adverse event. 2.Personal training stories 3.Near misses/adverse events	Narrative Stories

Note. This table identifies and describes themes identified from studies in the literature about feedback and teaching interactions in the operating room. The furthest right column lists the codes developed to reflect these themes which were then applied deductively to the current study's intraoperative dialogue data.