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Maintaining operative efficiency while allowing sufficient time for residents to learn

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ABSTRACT

Background: Surgical residents desire independent operating experience but recognize that attendings have a responsibility to keep cases as short as possible.
Methods: We analyzed video and interviews of attending surgeons related to more than 400 moments in which the resident was the primary operator. We examined these moments for themes related to timing and pace.
Results: Our surgeons encouraged the residents to speed up when patient safety could be jeopardized by the case moving too slowly. In contrast, they encouraged the residents to slow down when performing a crucial step or granting independence. Attending surgeons encouraged speed through economical language, by substituting physical actions for words, and through the use of Intelligent Cooperation. Conversely, they encouraged slowing down via just-in-time mini-lectures and by questioning the trainee.
Conclusions: We present recommendations for safe teaching in the operating room while simultaneously maintaining overall surgical flow. Teaching residents to operate quickly can save time and is likely based on an automaticity in teaching. Slowing a resident down is vital for trainee skill development and patient safety.

Introduction

Surgical attendings have competing responsibilities: to preserve patient safety and to allow future surgeons to function as the primary surgeon in order to gain confidence and independence. In an era of declining surgical resident volume,[1,2] it is crucial that residents have the time they need to learn and a chance to participate meaningfully in each case.[3] Yet it is common for hospitals to track the total time of a surgeon's cases, to minimize costs.[4] Shorter cases are associated with improved patient safety, as surgical complications increase and patient outcomes worsen when surgeries take longer to complete([5,6]) and when residents are involved.[7,8]

This tension between residents wanting to operate, with direct guided experience, and the attending surgeon and hospital's responsibility to keep cases short and safe was explored by Vikis et al.[9] The authors analyzed General Surgery resident perception of intraoperative teaching (IOT) with a focus on communicative instructional interaction (CII), a bidirectional communication between attending and resident during the case. CII is similar to Intelligent Cooperation, the cooperative verbal and physical exchanges that we have reported.[10] The General Surgery residents in the Vikis study recognized that a balance exists between the time constraints and the pedagogical benefits of gaining surgical independence. Additionally, they found that patient safety overruled their opportunity to practice.

If a resident is to practice as the primary surgeon, they require guidance as when to operate more quickly and when to slow down. The phenomenon of slowing down while operating was examined by Moulton et al.[11,12] Moulton et al. discovered that surgeons from General Surgery and other surgical subspecialties vacillate between a more automatic inattentive state and a more effortful attentive state. As these surgeons approach a critical part of the surgery, such as when faced with unusual anatomy, they transition "from the routine to the effortful."[11] These slowing down occurrences are either purposely planned or might arise spontaneously and are characterized by an increased cognitive effort to gain control over

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more critical moments in the surgery. Moulton et al. additionally noted that "slowing down" has potential consequences when trainees operate, as the teaching surgeon must increase their own attention to watch carefully the skills and actions of the operating resident. If a resident moves too quickly through a dangerous step, then the attending surgeon must actively instruct the trainee to slow down. The teaching surgeon must also alter their teaching approach during more difficult moments of the surgery as they pose a greater learning challenge for the trainee.[11]

In this study we applied Moulton's concepts of automaticity and cognitive refocusing to surgical teaching. We wanted to more deeply explore this balance between allowing a resident to operate, yet keeping the case as short and safe as possible. We have seen attending surgeons encouraging trainees to keep a case moving with alacrity. We have also seen them encouraging the resident to slow down even though it lengthens the operative time. We wanted to know how attendings maintain this balance. The purpose of this study was to identify and describe how surgical teachers intraoperatively guide a trainee in order to get a case finished in a timely manner, while slowing down when necessary. By understanding this balance in surgical teaching, we aim to help surgical attendings identify techniques to teach a trainee how to efficiently operate and progress, while allowing slower periods for explanation or caution.

Material and methods

We performed a thematic analysis on an existing database of surgical films and transcripts and post-surgical interview transcripts. This included a total of 6 h of surgical teaching cases and 3 h of interviews from a large teaching hospital. The original study was a Qualitative Analysis of five surgical teaching cases to classify verbal and physical surgical teaching behaviors.[13,14] That study included 13 participants, including surgical attendings and third-year Obstetrics and Gynecology residents, and generated more than 400 teaching moments for analysis. The cases were non-emergent and were performed by subspecialist gynecologic surgeons. Video and audio recording was performed with a hand-held camera. A detailed table of the types of cases and participants is shown in Table 1.

In that study, surgical case transcripts included both the words and actions used by the participants in the chosen teaching moments from the film clips. Each teaching moment was replayed approximately 10–15 times in order to record every word and action. All interviews were jointly conducted by a Pelvic Surgeon (GS) with 15 years of teaching experience and a cognitive psychologist (EBL). Surgical attendings watched the relevant film clip and then answered open-ended questions about their teaching methods specific to incidents captured on film. The most common question was "what were you thinking at that moment?" Although the interviews took place up to 1 month after the surgery, allowing for us to choose the teaching moments, our subjects were able to recall minute details. Only the surgical attendings were interviewed, not the trainees, as this was a study focused on attending surgeon teaching behaviors.

In our analysis, we focused on moments in which the resident was the primary surgeon, under the guidance of the attending. We employed a Naturalistic Inquiry([15]) in order to explore our data for concepts of speeding up and slowing down the resident. The totality of our data included case film, transcripts from case film, and post-surgical interview transcripts. We examined all of this for case examples and interview quotes that related to the themes of granting the resident surgical independence, saving time, speeding up the surgery, and performing a case efficiently. We defined speeding up as encouraging resident automaticity, and we defined slowing down as encouraging the resident to refocus cognitively. We noted the use of the words "efficiency," "time," "motion," "speed," "stop," "fast," "quick," and "slow."

We examined the data, looking for common themes, or codes, and we met to review and discuss them, often while playing the film clips or reading from the interview transcripts. Axial coding led to the development of major themes. Our process was an iterative one: we cycled through analysis of case transcripts, interview transcripts, and video clips multiple times, often going back to video to clarify our codes. Through constant comparison, emerging codes were compared with fresh data and the codes were further refined until we found nothing new. The evolving codes were discussed with the third author (SK) until a final group of themes developed.

The original project was approved as exempt by our Institutional Review Board.

Results

We discovered that when the resident is the primary operator, the surgical attending maintains tight control over the resident's pace of operating, encouraging them to either achieve an automaticity and flow (speed up) or cognitively focus (slow down). We

Table 1
Description of surgical cases.

Case number	Specialty[a]	Type of surgery	Participants[b]	Portion in which resident functioned as primary surgeon	Experience of attending[c]	Duration of surgery[d]
1	Minimally invasive gynecologic surgery	Diagnostic laparoscopy	Attending and third year resident	Insertion of ports; manipulation of camera	10–15 years	23 min
2	Minimally invasive gynecologic surgery	Total laparoscopic hysterectomy with ablation of endometriosis	Attending and third year resident	entire surgery	5–10 years	105 min
3	Reproductive endocrinology and infertility	Removal of ovarian dermoid	Attending, fellow, and third year resident	entire surgery	20–25 years	145 min
4	Female pelvic medicine and reconstructive surgery	Total abdominal hysterectomy and Sacral colpopexy	Attending, fellow, and third year resident	Total abdominal hysterectomy	10–15 years	91 min
5	Gynecological oncology	Total abdominal hysterectomy and pelvic lymph node dissection	Attending, fellow, and third year resident	Total abdominal hysterectomy	10–15 years	78 min

This table was adapted from Sutkin et al., J Surg; 72:243-250.
Cases 1-3 were performed laparoscopically and cases 4 and 5 through an open abdominal incision.
[a] These are all subspecialties of Obstetrics and Gynecology.
[b] All residents were general Obstetrics and Gynecology residents. Obstetrics and Gynecology is a categorical 4-year residency. All fellows were training in that particular subspecialty.
[c] Years of teaching experience, as expressed in years since completing specialty or subspecialty training.
[d] Duration of portion surgery performed by resident. Case 1 is an exception: the resident functioned as a first assistant.

observed a diverse range of manifestations of both encouraging the resident to speed up and slow down, used by all five subjects regardless of attending surgeon teaching experience. We present them in Tables 2 and 3 with case examples and attending surgeon interview remarks.

Encouraging the resident to speed up

With the resident as primary operator, attending surgeons valued surgical efficiency and pushed the residents to maintain the forward progress of the case. Their primary reason was to reduce the chances of complications, but they also wanted to finish early to keep to a schedule or complete as many cases as possible per block of OR time. For example, surgical attending #5 expressed encouraging the resident to operate more quickly out of concern for the patient's pulmonary hypertension and cardiac disease.

Surgeons described an overall strategy that included keeping track of time, monitoring the progress of all cases, minimizing use of OR resources, and avoiding finishing late. This included calculating how much a trainee could participate based on the number and complexity of the day's cases, always with the goal of finishing on schedule.

Manifestations of the encouraging the resident to speed up

Surgical attendings in our study employed three behaviors to push the residents to move more efficiently. The first was the use of

Table 2
Reasons to encourage the surgical resident to operate automatically (speed up) or cognitively refocus (slow down).

Reasons to Encourage the Resident to Speed Up or Slow Down	Example from Cases[a]	Representative Interview Quote
Reasons to Encourage the Resident to Speed Up		
Patient Safety: Concerns for Patient Safety prompt Attendings to expedite the surgical case	F3 and R3 are working together to coagulate an ovary with A3 assisting, when the Anesthesiologist voices concern about rising CO_2 levels and crepitus. As F3 and R3 discuss how much more to coagulate, A3 interrupts and expresses his desire for the case to be completed: F3: “you think I could get that…” A3: “I would, ummm” F3: “What were you going to say, Dr. (A3)?” A3: “I would just get this done because I don't like the CO_2 problem.” Despite A3's recommendation, F3 coagulates more. She starts to say something, but A3 interrupts her: “Yeah. You see it looks pretty good?” F3: “Okay. So stop?” A3: “Yeah.” (Case 3, 31:45 - 32:20)	“When you are in a teaching institution you have to protect the patient's safety and at the same time allow some level of learning to take place. (Case 1 Attending Interview)
Finishing on Schedule: Attendings expressed a desire to not prolong the case unnecessarily	A2 is coagulating the uterine vessels while describing the difference between vessels in large uteri and small uteri. As A2 switches instruments, he looks at the clock on wall and says "Alright Doctor. Operate like the wind. We have to be done by 2:00." (Case 2, 2:35 – 2:45)	“You want to get the case moving. It's for OR efficiency. None of us want to be there till late at night.” (Case 2 Attending Interview)
Reasons to Encourage the Resident to Slow Down		
Crucial Steps: Attendings will purposely slow down the case in order to emphasize the potential jeopardy of a particular step to the patient's safety	R5 prepares to dissect the peritoneum near the tubal-ovarian vessels, often referred to as the “Infundibulopelvic Ligament”, or the “IP”. A5 inserts a malleable in the field. R5 holds the bovie next to the malleable. A5 speaks with a volume higher than he has used so far in the case. “You can see your IP right underneath there. You see that? See that blue?” R5 moves the bovie out of the field. A5 uses his right hand to grab a lap sponge, which he moves close to the field without inserting it. A5: “See how close you are?” A5 still holding sponge in a curled right hand. A5 bumps/pushes the back of right hand against the top of R5s left hand which holds the bovie. This happens on the word “close.” A5 looks directly at R5. A5's hands are pulled back. He freezes instantaneously. There is a significant pause. A5: “You see it?” (Case 5, 20:30 - 21:10)	"She probably was bov'ing right on top of it, because it's such a large vessel. And in my opinion probably wasn't seeing where she was. She was just going. Know what I mean? (I was trying to communicate to her) ‘pay attention.’ If you don't pay attention – that's a serious thing. I think that was probably to keep her hand out of it as well. " (Case 5 Attending interview)
Promoting independence: Attendings will purposely slow down the case to encourage the trainee to make an independent intraoperative decision	A3 is holding onto the scope while R3 inserts the Endo Catch bag. They have not yet started the excision of the ovarian mass. A3: "So, plan the incision for me please." R3: "Uhhhh." A3 hands laparoscopic scissors to R3. A3: “So what are the principles?" F3: "Antimesenteric side." R3: "Antimesenteric side." A3: "Antimesenteric side. That's what I want to hear." (Case 3, 17:55 - 18:10)	“For something like this, like a routine hysterectomy, I want to see how she, since she was in her third year, in her mind, if this was their patient, how would she approach it? She may not have that formulated correctly, so I can kind of say start here and then say: where do you want to go next? What's your next important thing to look at?” (Case 5 Attending interview)

A = Attending, R = Resident, F = Fellow.
[a] Underlined text contains a representative example of the category. Surrounding, non-underlined text provides details of the interaction and context.

Table 3
Manifestations of encouraging the surgical resident to operate automatically (speed up) or cognitively refocus (slow down).

Manifestations of Encouraging the Resident to Speed Up and Definitions	Example from Cases[a]	Representative Interview Quote
Using Economical Language: Attendings communicate their teaching intentions with as few words as possible	A1 is instructing the R1 how an ovary can be flipped in order to thoroughly view the ovarian fossa with a combination of an adequate grasp with the laparoscopic instrument on the fulcrum of the ovary and the correct angle of wrist supination and lateral movement. His commands are: "Grab closer to the ovary. Take a big bite. Rotate." (Case 1, 15:10 – 15:50)	"If you speak in complete sentences you don't have the time to explain the key point of what you really want to convey…. Because I think they can understand by having me point out a few key words here and there…. By the time you speak a complete sentence you're already moving onto the next task already. Things are happening (snaps fingers) like that." (Case 1 Attending interview)
Demonstrating Specialized Physical Actions: Attendings use discrete physical actions to substitute for verbal teaching	A1 and R1 are jointly examining the pelvic structures. When R1 does not move the camera to the correct structure, A1 uses his elbow to adjust camera position. His elbow only contacts the stem of the laparoscope for less than second but accomplishes the intended adjustment of the camera view. No words are spoken. (Case 1, 18:15 – 19:00)	"It was quick. It was done. …and I think it's a form of feedback too. They know that I'm not where I'm supposed to be. I could easily just sort of hold their hand and put it where I want it to go but my elbows are right next to her hands anyway." (Case 1 Attending Interview)
Intelligent Cooperation: Attending and trainee perform a rapid succession of cooperative steps, often wordlessly	A4 and R4 are opening pfannenstiel incision. R4 holds bovie. A4 holds debakey forceps. A4 is leading R4 through the incision. As A4 pushes on the tissue with the forceps, R4 applies bovie current, sometimes contacting the forceps and other times contacting the tissue directly. They alternate, pushing and activating the bovie, working together as a team. Most of this is done wordlessly. (Case 4, 4:25 - 4:45)	"I'm teaching her right here to do the 'cut and paint' through vessels. This way I can sort of push down tissue and I'm not going to be tempted to cauterize everything for her so she can learn that technique. It's for efficiency. I call it the 'Cut and Paint' technique." (Case 4 Attending Interview)
Manifestations of Encouraging the Resident to Slow Down and Definitions		
Delivering Mini-Discussions: Attending slows down the case to deliver a brief lecture, related to the current step of the surgery	R3 is using electrocautery on the ovary. A3 interrupts her and says: "So, (R3) if in the worse scenario you just couldn't control the bleeding, and this ovary is pouring out blood, what is your management? What are your options?" Discussion then continues about management options. R3 suggests suturing, and A3 explains why that should only be done as a last resort. R3 pauses. A3: "So I'm listening, R3" R3: Silence. Then A3 tells R3 the answer. (Case 3, 20:45 – 21:40)	"…residents have to know 'I've never been here before, I don't know what the hell this is going to be, but I have some orderly approach to it." So I do that. 'Ok, what would you do now if we got into a bleeder, blah blah blah?" (Case 3 Attending interview)
Questioning the Trainee: Attending interrupts the surgery with a question, usually to assess the trainee's content knowledge related to that step in the surgery	R4 continuing pfannenstiel incision. A4: "Nice." A4 retracting and manipulating the wound with the back of her debakey. A4: "What's your upper landmark for this?" R4: unintelligible A4: "Your upper landmark is so you can get to go a little beyond your tranversalis fascia, right? because you're trying to go up to your umbilicus, right? That's why I usually wait for a … unintelligible." A4: "Good. Nice. You're not in that fascia anymore." (Case 2, 4:05 - 4:25)	"And I'll essentially kind of pimp them a little bit on why is it ok to make a pfannenstiel incision there but it's not ok to put a port there. And then to drive home the point I'll then say if you do put your port two finger breadths above the pubic symphysis at some point you will put a hole in the bladder." (Case 2 Attending interview)

A = Attending, R = Resident, F = Fellow.
[a] Underlined text contains a representative example of the category. Surrounding, non-underlined text provides details of the interaction and context.

economical language, speaking as few words as possible to communicate intent. For example, a surgical attending might give specific and brief commands or use "deictic" terms, ie: pointing or referring words, such as "here" or "that," to point to a structure or stand in for a more complex phenomenon. Attending surgeons described how a few brief words can easily communicate complex teaching points; for example, terse phrases, such as saying "That one" delivered without pausing the surgery. Surgical attending #1 remarked that he purposely avoids long sentences because they have the potential to slow down a case that is "moving" along.

A second surgical attending behavior we observed was the substitution of physical actions for words by pointing towards a location, repositioning a resident's instrument, or even placing their hands on a resident's hands to indicate proper hand or instrument position. Attending surgeons described it as a means to guide the trainee without interrupting the flow of the surgery. Surgical attending #4 explained that when operating with a more experienced resident that purposeful hand motions could be substituted for more explicit verbal instruction.

The third attending surgeon behavior we observed was something we have called "Intelligent Cooperation (IC);" that is the attending surgeon guides the trainee to perform rapid surgical steps in a manner that seems to simultaneously enhance surgical learning and ensure forward progression of the case.[10] In this mostly wordless cooperation, the attending surgeon performs a small step which leads to the trainee performing one, each action quickly leading to the next. We observed attending surgeons initiating a step as the trainee watches intensely, and ending with the trainee immediately performing the corollary, next phase of the step. For example, Surgical attending #3 explained that he rapidly placed and replaced multiple clamps on the umbilical fascia in order to provide the exposure required to facilitate the resident's suture placement.

Encouraging the resident to slow down

Attending surgeons also purposefully encouraged the resident to cognitively refocus and proceed more slowly for two common reasons:1) when the resident was about to perform a crucial step, for example when the resident was suturing near the ureter, or 2) when the resident was being granted independence over a portion of the surgery, such as allowing a Chief Resident to take lead on a hysterectomy. For example, Surgical attending #5 remarked that sometimes it was important to allow the resident time to think

about the next step instead of being instructed what to do.

Manifestations of encouraging the resident to slow down

Surgical attendings in our study employed two behaviors to encourage the residents to slow down. The first was pausing the surgery to deliver mini-discussions, mostly lasting between 5 and 20 s, for example, about the anatomy of the surgical field. These discussions often involved the trainee and attending surgeons stopping their current actions and changing their gaze from the operative field to each other. For example, Surgical attending #2 explained how he frequently teaches residents to identify a neutral position for the uterus ("9 o'clock") that results in more complete coagulation of the uterine artery.

The second behavior associated with encouraging the resident to slow down was an interruption of the trainee's action by asking a Socratic type question to assess the trainee's knowledge relative to that step in the surgery. This often occurred when a trainee was performing an action incorrectly or when the importance of a surgical step required didactic emphasis.

Tables 2 and 3 summarize these themes and present representative case examples and interview quotes. Fig. 1 displays graphically how these manifestations can appear through a surgical case.

Discussion

Surgical teaching mirrors surgery itself, moving quickly and progressing at a rapid pace. Attending surgeons in our study encouraged the residents to maintain this pace, but occasionally encouraged them to slow down and cognitively refocus for crucial steps, teaching, or when a trainee was being granted more independence. Similar to Vikis et al., the effect of time on teaching and independence was a prominent theme in our case examples and interviews. While time was a *constraint* on surgical teaching in our study, it was also often *the content* of surgical teaching. We discovered both physical and verbal manifestations of encouraging the resident to speed up and slow down, and film review allowed us to capture and analyze it in detail. Patient safety was always a major concern, as it was a factor in both speeding up to minimize anesthesia exposure and slowing down before crucial steps.

Teaching in the OR can be a challenging task. The OR is a high-stakes environment, is loud and full of distractions,[16,17] and the teacher is often charged with teaching several trainees of different levels and experience, all the while ensuring a safe and efficient case. Trainee presence lengthens case time, as in one large, population-based cohort study, surgeries performed in a teaching hospital lasted 22% longer than those performed in nonteaching hospitals.[18] In our previous research([19]) and in surveys of trainees,[20] slowing down surgical teaching to promote independence has been linked to a perception of superior teaching. Teaching residents to operate more rapidly can contribute to a shorter case, and will decrease OR costs that are largely dependent on case time.[21]

According to Moulton et al., the purpose of slowing to a more attentive state was to gain control over the risky, challenging, or unpredictable events in the surgery.[11] This involved watching for and interpreting environmental cues that signal these events in the surgery. We suspect our teaching surgeons were paying attention to similar environmental cues and that encouraging the resident to slow down represents the attending surgeon gaining control over the case and the learning material. We did not examine our data for evidence of increased cognitive effort, but we suspect that encouraging the resident to slow down requires active effort from the teaching surgeon. A study comparing experienced and inexperienced teaching surgeons might allow us to explore pace transitions from a cognitive perspective. We wonder if experienced teaching surgeons gain a similar level of automaticity in teaching, similar to the surgeons in Moulton et al.'s study who were able to operate in a rather automatic state. If a surgeon has taught a surgical principle numerous times, then repetition of that teaching becomes automatic and can be accomplished efficiently.

Based on our findings, we offer the teaching surgeon some recommendations on simultaneously teaching and allowing the resident to operate without substantially slowing down the case, as well as slowing the case down when necessary (see Table 4). Although residents may gain from opportunistic discussions, we suspect that learning to operate without many interruptions is vital to a trainee's mastery over individual surgical steps and the orderly progression on an entire surgery. For example, if a trainee is moving a laparoscopic instrument in the wrong direction, a nudge of her instrument without interruption of her motion accomplishes more than having her stop the motion, explaining the direction to move, and then having her restart the motion. The surgical attending must continually assess if the trainee has enough experience to perform a surgical step or if they should be interrupted. Lack of comment from a watching surgical attending implies the resident is performing adequately. Surgical residents also benefit from opportunistic teaching preoperatively and postoperatively.[22]

Our study was limited by not interviewing the residents who may have provided opinions about the effectiveness of the teaching, but that was not the intent of our study. Although we only

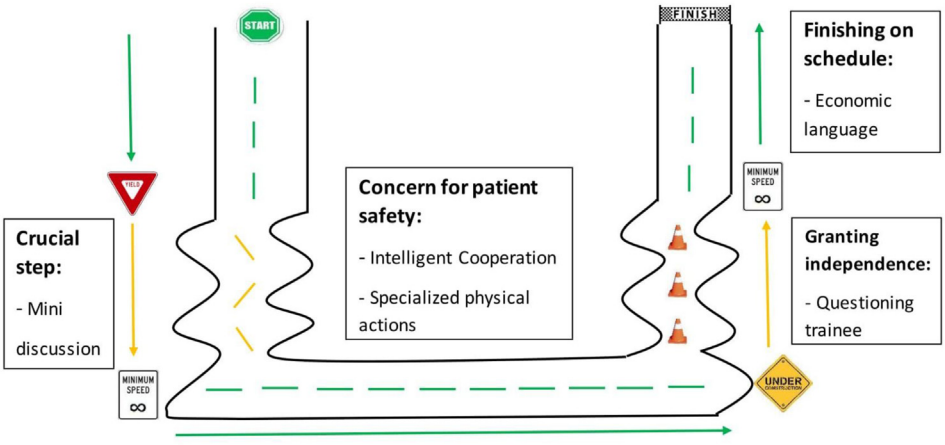

Fig. 1. Title: A road map for efficiency and safety in intraoperative teaching.

Table 4
Advice for the Teaching Surgeon: How to Keep the Case Moving Forward and Ensure Patient Safety While the Resident is Operating.

	Recommendations
Encouraging the Resident to Operate Automatically	
Use Economical Language	Communicate your intent with as few words as possible. Avoid lengthy descriptions
Demonstrate Specialized Physical Actions	Substitute gestures and actions for verbal teaching
Intelligent Cooperation	Work with the trainee to develop a repartee of cooperative actions
Encouraging the Resident to Cognitively Refocus	
Deliver Mini-Discussions	Interrupt the trainee's actions with a brief lecture, highlighting important aspects of the next step in the surgery
Question the Trainee	Stop the trainee with a question to assess their preparation for the next step in the surgery

included five subjects and five surgeries, we analyzed more than 400 teaching moments. A strength of our study was the makeup of our team, who provided contrasting surgical and social science backgrounds. Studying IOT effectiveness remains elusive.[3] Additionally, we are unsure if the presence of the filmographer changed the participants' behaviors. One metanalysis suggested a small and inconsistent observer effect in health professions education research.[23] Although our participants knew they were being filmed, they were not made aware of the original study question which was to classify verbal and physical teaching behaviors. Furthermore, all reported during follow-up interviews that they were occupied by the surgery, their teaching duties, and some distractions in the room, but were generally unaware of the presence of a filmographer.

Conclusion

Surgical attendings teach their residents and maintain control over the pace of the case and safety of the patient by allowing them to operate while alternating between encouraging them to maintain a quick pace while slowing down during crucial moments. Future research should examine the cognitive aspects of teaching surgery, specifically, how teaching surgeons transition from an automatic state to a more attentive state. Future research could also examine common teaching routines employed by attending surgeons.

Fig. 1 Caption: Factors and Manifestations of Encouraging the Surgical Resident to Operate Automatically (speed up) or Cognitively Refocus (slow down). During the straightaways, speed is crucial because of concern for patient safety and the need to finish on schedule; teaching surgeons encourage the resident to speed up through the use of Intelligent Cooperation, Specialized physical actions, and Economic language. During the curves, slowing down is vital because of a crucial step or the need to grant the trainee independence; teaching surgeons encourage the resident to cognitively refocus through the use of Mini-discussions and Questioning.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2018.11.035.

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