Unsettled teamwork: Communication and learning in the operating theatres of an urban hospital

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Abstract

Aim: To explore the unsettling effects of increased mobility of nurses, surgeons and other healthcare professionals on communication and learning in the operating theatre.

Background: Increasingly, health care professionals step in and out of newly formed *transient* teams and work with colleagues they have not met before, unsettling previously relatively stable team work based on shared, local knowledge accumulated over significant periods of close collaboration.

Design: An ethnographic case study was conducted of the operating theatre department of a major teaching hospital in London.

Method: Video recordings were made of 20 operations, involving different teams. The recordings were systematically reviewed and coded. Instances where difficulties arose in the communication between scrub nurse and surgeons were identified and subjected to detailed, interactional analysis.

Findings: Instrument requests frequently prompted clarification from the scrub nurse (e.g. "Sorry, what did you want?"). Such requests were either followed by a relatively *elaborate* clarification, designed to maximise learning opportunities, or a by a relatively *minimal* clarification, designed to achieve the immediate task at hand.

Conclusions: Significant variation exists in the degree of support given to scrub nurses requesting clarification. Some surgeons experience such requests as disruptions, while others treat them as opportunities to build shared knowledge.

Summary Statement

Why is this research needed?

- Healthcare professionals now often step in and out of newly formed, transient teams, and frequently work with people they have not met before.
- Healthcare professionals are increasingly mobile, moving jobs from one hospital and country to another.
- The effects of increasing instability of teams and job mobility need to be investigated, as effective teamwork is a critical factor in patient safety.

What are the key findings?

- Nurses in a London hospital, including those who had recently arrived from overseas, received varying degrees of support when they encountered terms or surgical items they were not familiar with.
- Surgeons responded to requests for clarification by giving elaborate answers, designed to maximise learning opportunities, or by giving minimal answers, designed to achieve the immediate task at hand.

How should the findings be used to influence policy/practice/research/education?

- Specific, local knowledge of individual colleagues' ways of working, use of instruments, and nomenclature, must be made explicit to newly appointed staff, and not taken for granted.
- The operating theatre should be seen as a clinical learning environment in which admitting to "not knowing" is seen as a sign of professionalism and an opportunity for inter-professional development.

Keywords: operating theatre, nurses, surgeons, communication, learning, teamwork, mobility, migrant nurses

Introduction

Effective teamwork and communication between health care professionals is a critical factor in patient safety. That is now evidenced in a growing body of research (Lingard *et al*. 2002, 2004, Makary *et al*. 2006, Williams *et al*. 2007), and recognised in major reports published following high profile incidents of medical error and harm to patients (Berwick 2013, Francis 2013). A key challenge for the National Health Service (NHS) in the United Kingdom (UK) and other major healthcare organisations across the world now and in the years to come is to improve inter-professional collaboration under rapidly changing social conditions. Some of the most significant changes – acutely visible in urban hospitals, especially in a global city such as London - are related to increasing mobility of (health) professionals. Organisational policies have served to increase mobility within jobs, requiring staff to work in "transient" teams, i.e. teams that are reconfigured on a regular - often daily - basis. At the same time, global and national migration processes and reduced opportunities for permanent employment have led to increased mobility

within the international labor market. One significant effect of increased mobility is that health care professionals can no longer rely on a large body of taken-for-granted knowledge, accumulated over many years of close collaboration in relatively stable, settled, static, permanent teams (Silén Lipponen *et al.* 2005, Finn & Waring 2006, Gillespie *et al.* 2010, Gillespie *et al.* 2013).

The paper explores the effects of these social changes through an ethnographic case study of the operating theatres of a major hospital in London. Operating theatres are one site where the "unsettling" of teamwork is highly visible. Where up until about 15 years ago, surgeons in this site often worked with the same group of nurses for decades, during which time they accumulated a significant body of knowledge about how colleagues work, they now step in and out of newly formed, transient teams as they move from one operating list to the next, and frequently work with people they have not met before. These include locums and agency staff, in-training and newly qualified staff, staff from outside the UK, and staff on fixed term rotations. Concerns have been expressed at grass roots level about these changing working conditions (Nestel & Kidd 2006). Both nurses and surgeons have voiced a preference for "stability", as it would promote efficiency and perhaps ultimately also patient safety. This is the exact opposite of the official rationale for policies that have the effect of reducing stability, which suggest that "flexibility" maximises efficiency (Finn & Waring 2006).

We investigated the effects of relative instability and unpredictability in a major teaching hospital in London. At this site, staff are drawn from a large pool of surgeons, nurses, anesthesiologists and other staff, who work across different theatres at different sites, performing a wide range of different surgical procedures. Using interaction analysis, we explore how conditions of relative instability are visible in the everyday, lived experiences of surgeons and nurses, focusing on a recurring task at the operating table: the passing of instruments and other

items to and from members of the surgical team. The study is part of a larger program of ethnographic work in which we analyse video-recorded team work, building on prior research based on interviews with nurses and surgeons and observations aimed at overall assessments of teamwork (Lingard *et al.* 2006, Sevdalis *et al.* 2009).

Background

Interview studies and observational studies have highlighted the preferences of nurses and surgeons for working in established teams in the operating theatre. For instance, Gillespie *et al*. (2010, p. 736) interviewed Australian nurses and surgeons, and concluded that "[f]or the majority of participants working in established specialized teams implied a familiarity with the nuances of procedure and the surgeon and/or anesthetist, as well as knowledge of the strengths and limitations of other team members. Hence, teams worked in anticipatory, co-operative ways which enabled the surgical list to run efficiently, even when the operations were complex and prolonged."

Riley and Manias (2006) did ethnographic work in Australian operating theatres. They found that "[s]urgeons expected nurses to have knowledge about their individual preferences accurately recorded and they challenged and disciplined nurses for any lack of precision" (p. 1545; see also [AUTHOR NAME] on preference cards kept by theatre nurses). The expectation that nurses know what surgeons need as they are operating, even if they do not state it verbally, or state it wrongly, is illustrated by one slogan well-known among surgeons which goes, "Give me what I need, not what I asked for". Nurses themselves take pride in their ability to anticipate and pass instruments even before the surgeon has asked for them and value their knowledge of

surgeons, treating it as a sign of professionalism, as well as a means of exercising power over surgeons and other nurses ([AUTHOR NAME]).

Riley and Manias (2006) also found that theatre nurses develop an ability to read surgeons' moods. As they put it, "sometimes without a word being spoken nurses knew the inner state of the surgeon by standing at the door and looking, gathering in the tension that seeped from the surgeon and permeated the air" (p.1548). They argue that such ability enables nurses to act as *peacekeepers* (Silén-Lipponen *et al.* 2005 speak of *pacifiers*), e.g. to "exercise silence through judicial wisdom" (*prudent silence*, p. 1548), so as to avoid tensions and irritations which could ultimately put the patient at risk. Finn and Waring (2006), drawing on observational research in England, subsume the knowledge of other members of the team under *architectural knowledge*, i.e. knowledge that "…informs assumptions about the knowledge that must be explicitly communicated; it enables effective anticipation and responsiveness to others; and ultimately shapes the performance of the team in the delivery of surgical care" (p. 119). They argue that team stability is central to the formation of this knowledge.

Opportunities to develop architectural knowledge are now dwindling. Increasing mobility of staff, as well as policies aimed at the creation of flexible transient teams are diffusing experience and *unsettling* previously relatively well-established working conditions. Increasingly, nurses and surgeons face uncertainty about the professional baggage of others in the team – their knowledge, skills, and dispositions. Silén-Lipponen *et al.* (2005), who interviewed Finnish, American and British theatre nurses, note that in their respective work places the composition of teams often changed daily, disturbing "the balance of teams" and ultimately "impairing one's ability to work in the new team" (p. 62). Gillespie *et al.* (2010) speak of the "fluidity" of teams and their "limited opportunities to meet and form regimens of shared practice and knowledge". A

central theme in Gllespie *et al.*'s study (2013) is that "intermittent membership influences team performance" (p. 389).

Finn and Waring (2006) made similar observations. They note that the "danger" of working in theatres and teams with which one is not familiar or experienced "is not only the difficulty of not having a well-developed and shared architectural knowledge between those individuals, which impacts on the effectiveness of communication and coordination, but the over-reliance on a set of assumptions and knowledge acquired elsewhere may not necessarily hold true in these new and unfamiliar teams or situations" (p.121).

Some studies have also highlighted the success of transient teams, showing that communication *can* be effective *in spite of* the constraints on sharing knowledge about each other. For instance, Gillespie *et al.* (2010, p.736) noted that "[i]n some instances, it appeared that even when staff were unfamiliar with each other, and had not worked together as an established team, they were still able to coordinate their actions and strategize accordingly". This finding resonates with studies that have systematically investigated *interaction* between health care professionals using video recordings, showing how collaborative tasks such as instrument passings are achieved *in situ* (Sanchez Svensson *et al.* 2007, Koschmann *et al.* 2012, [AUTHOR NAME]). Through careful "reading" of what the surgeon is doing, scrub nurses (henceforth: SN) can often anticipate requests, and remain "ahead" of the surgeon (Mitchell et al., 2011:822). Frequently a subtle hand or arm movement, performed in the context of a specific stage in a (routine) operation, signals to the SN an upcoming request for a specific instrument, enabling her to pass the instrument before the surgeon has called for it ([AUTHOR NAME]).

While these interactional studies have highlighted the smooth passing of instruments, in this article we explore what happens when additional interactional work is required to clarify

exactly what instrument the surgeon needs. We ask, how do nurses and surgeons signal a need for clarification, and how do they handle them? What might be said about the effectiveness and safety of their ways of dealing with the need for clarification? What might be the underlying concerns of these strategies, and how can we account for the occurrence of the need for clarification in the first place? How are they situated in the wider context of operating theatres and health care policies?

The study

Aim

To explore the unsettling effects of increased mobility of nurses, surgeons and other healthcare professionals on communication and learning in the operating theatre.

Design

An ethnographic case study was conducted of the operating theatre department of a major teaching hospital in London. Drawing on the naturalistic inquiry of social interaction, the study was designed to explore the understandings of team members in concrete instances of teamwork. To allow for detailed, in-depth analysis of the complex, moment-by-moment unfolding of social interaction around the operating table continuous and relatively comprehensive video records of operations were produced. Such audio-visual records can be used to render visible how talk at the operating theatre is entwined with the performance of practical tasks (Heath, Luff & Hindmarsh 2010).

Participants

The data set features 3 consultant surgeons (henceforth: CS), 5 specialty surgical trainees

(henceforth: ST) and 13 nurses. The analyses presented in this paper are focused on one SN, working in two operations, each time with a different CS and a different ST. The SN had arrived from the African continent approximately four months prior to the operation from which Example 1 was taken, while Example 2 is from an operation that was performed about 8 months into her employment at this hospital. While she is not new to theatre nursing, she had received her training and gained theatre experience overseas. In Example 1, the surgeon operating is a CS, who trained in several countries including the UK and had been a consultant at this hospital for five years. He was assisted by a ST. In Example 2, the surgeon operating is a CS, who trained in the UK and had been a consultant for 7 years. He was assisted by two STs. In both examples, the coordinating CN was the same person. She had worked with these CSs for at least 4 years. She was one of a number of circulating nurses present during the two cases.

Data collection

Data were collected at operating theatres in a major teaching hospital in London. Fieldwork was carried out between August 2012 and January 2013 by two researchers ([AUTHOR NAME]). XX is a registered nurse with theatre experience and XX is a research psychologist specialized in the study of social interaction. Neither participated in the practices they observed. Staff at this hospital are used to visitors observing in theaters and we found no evidence of members orienting to them and/or their cameras during fieldwork.. A total of 20 operations were video recorded using two tripod-mounted High Definition video cameras, producing over 68 hours of film, or 34 hours of operating time. The recorded operations represent a mixture of laparoscopic and open operations in general, upper gastro intestinal, and bariatric surgery. In addition to video recordings, all key participants in the research were interviewed. Field notes were kept throughout the research period, documenting events not captured by the cameras.

Ethical considerations

Ethical approval was obtained from the National Health Service Research Ethics Committee to collect data in these operating theatres. All people present in the theatres, including the patients, have given their written informed consent.

Data analysis

Building on methodological innovations in bringing together ethnography and interaction analysis, we attend to talk and social action as well as to the wider social context in which micro-level discourses are produced (Iedema 2009). *Video recordings* are central to the analysis. We analysed these data in two stages. First, to obtain a general overview of the video data, the two researchers ([AUTHOR NAMES]) undertook a *systematic review and coding* of the data. Data coding involved identification of instrument requests and responses to instrument requests. In total, 5,484 data points have been coded. InqScribe was used to time-code the logged events, producing a transcript of each of the operations.

Second, a sample of clips was subjected to in-depth *interaction analysis*, which was led by XX (a linguist) and XX. Drawing on the systematic review, the authors jointly created a collection of instances in which clarification was required to achieve the instrument pass. Through joint iterative engagement with this sample the instances were classified into two basic categories, which we discuss in this article. This was an inductive process by which emerging categories were constantly compared against further cases and redefined accordingly, until they were congruent with, i.e. accurately represented the entire sample. The two categories represent two types of responses to the need for clarification before an instrument is passed, which we illustrate in this article with two key examples.

Rigour

Rigour was achieved through detailed transcription of the moment-by-moment unfolding of nurse-surgeon interaction. The transcription of talk draws on the conventions described by Jefferson (in Atkinson & Heritage 1984), outlined in Table 1.

Table 1. Transcription conventions.

Symbol	Meaning
Numbers in parenthesis (2.0)	The length of a silence in tenths of seconds.
A single dot in parenthesis (.)	A silence of a tenth of a second or less.
A single dash -	A cut-off of the utterance.
A period .	Falling intonation.
A comma ,	A falling-rising intonation.
A question mark ?	A rising intonation.
Underlining	Stressing or increasing loudness.
Italicised decriptions	Bodily actions, notably replacements of the entire body, head and hand gestures, and the direction of gaze are described so as to arrive at an integrated account of talk and action.

The detailed transcription ensured that interpretations were grounded in actual interactions in the operating theatre, while at the same time producing a degree of transparency, enabling third parties to check these interpretations. In our methodological approach, the focus is on participants' own orientations during operations. Hence we paid close attention to the ways in which surgeons and nurses displayed their understanding of the situation they were in. Findings were validated by all members of the research team (a nurse, a surgeon, a linguist and a research psychologist) and discussed with members of the nursing and surgical community at the research site and beyond. While these discussions provided useful opportunities to check background

information, we have grounded our interpretations in the strips of interaction under scrutiny, treating post-observational discussions as interactional events in their own right.

Findings

Examining instances where instrument requests and responses prompt clarification (e.g. "What did you say?") we found two ways in which teams deal with instability. In the first type of response, a request for clarification by the nurse is followed by elaborate clarification by the surgeon. In the second type, the nurse's request is followed by minimal clarification. These responses are coupled with different concerns. The elaborate response serves to maximise learning opportunities, with a view to future requests. The minimal response serves the achievement of the immediate task at hand, thus minimising "disruption" of the flow of surgical action.

Context of the examples

Both operations are complex. In the first example, surgeons are performing an esophagectomy, a procedure for removing the patient's gullet and reconstructing it. This operation took 5hrs. In the second example, surgeons are performing a sigmoid colectomy, whereby the sigmoid colon is removed and the descending colon directly connected to the rectum. This operation took 3.5hrs. One indicator of their complexity from a nursing perspective is the sheer number of instruments involved. In both procedures, up to 5 sets of instruments are used, of which the main set alone consists of about 40 different instruments, totaling 130 instruments, many of which are known under a range of different names (cf. Goldman 2008).

Surgeons in the first example made 211 requests addressed to the SN; that is one request every 87.6 seconds. On 30 occasions did the SN request for clarification or confirmation before

passing the object required; that is 1 in 7 requests. In the second example, they made 132 requests; that is one request every 92.4 seconds. On 21 occasions did the SN request clarification or confirmation before passing the object required; that is 1 in 6 requests.

The examples are from some of the first cases that the nurse acted as SN (rather than circulating nurse; henceforth: CN) assisting the respective surgeons. Thus at that time she had had limited opportunities to learn the specific requirements, instruments and nomenclature of these procedures and the way in which they are performed by these specific surgeons. At the start of the operations the surgeons did not know about the SN's limited experience. While she introduced herself when the team went through the World Health Organization's Surgical Safety Checklist, she did not mention that she was inexperienced with this procedure.

Elaborate response: maximising learning opportunities

The first example (Figure 1) opens with the ST asking for a tie. As they are tying vessels deep inside the abdomen, they need a tie that is mounted on a long forceps. One surgical textbook describes this task as, "An artery forceps is first passed carefully under the vessel and the jaws opened sufficiently to grasp the ligature material, which is carried to the open jaws by a second artery forceps – 'a *mounted* tie'" (Farquharson & Moran 2005, p. 3; their emphasis). It is this knowledge of instruments and their aptness for performing recurring tasks that surgeons traditionally expect nurses to have (cf. Mitchell & Flin 2009).

Figure 1: 'Mounted tie'

ST: Tie please,

SN: Two o? Zero?

ST: Two o please.

SN: *Picks up a tie.*

CS: On- mounted please.

SN: *Holds tie stretched between both hands while passing it to ST.*

CS: Mounted. Mounted.

SN: In what?

ST: *Picks up instrument from mayo stand and mounts tie in it.*

CS: Always in a big Sawtell (.) or a Lahey or something.

(2.0)

CS: Mounted means (clamped). That's what (it means).

(3.0)

CS: You haven't heard the term mounted before,

SN: *Passes an instrument to ST.* Er this is the first time I'm doing this oesophagectomy (actually).

CS: But in surgery you never heard the term mounted before?

SN: Yeah yeah I heard.

CS: Mounted tie?

SN: But I didn't know mounted in a in a (.) needle holder, or (.) in-

CS: No tie. Mounted tie. You never heard of the term mounted tie? *Makes small side-to-side head movement.*

SN: No. *Makes small side-to-side head movement.*

SN: *Passes instrument from ST to trolley and from trolley to ST.*

CS: It means mounted on a long (.) er artery forceps or:

SN: *Makes head nod.* (Er ?)

CS: So that way when it when it's very deep you can go around the end of that. *Makes gesture with right arm and hand.*

SN: *Makes head nod.*

In our Figure 1, the SN does not meet these expectations. The example opens with the request of the ST for a tie. That prompts the nurse to initiate clarification, designed to seek confirmation about the size of the tie ("two o?"). When both ST and CS have provided confirmation the nurse pulls a tie out of its packet. As she is doing so, the ST is "waiting", with his body oriented slightly to the right, where the SN is (but he cannot see her). At the same time, the CS looks up

from the operative field towards the SN, and specifies the request further: "mounted". The SN then passes a tie to the ST, seemingly ignoring the request to *mount* the tie. The CS then repeats his request twice, the second time a little louder ("mounted. mounted"), but the ST has already taken the unmounted tie in his hand. He picks up an instrument from the Mayo stand, and it looks like he mounts the tie in it. In the mean time, the SN responds to the CS's repeated specification, asking, "in what?" In doing so she asks for more specification, which the CS then provides, suggesting two possible instruments (Sawtell and Lahey).

In what follows the CS, who has now shifted his visual attention back to the operative field, and the nurse, jointly reflect on this exchange. The CS provides a definition of *mounted* ("Mounted means (clamped)"). The nurse is then still standing next to the ST, looking into the operative field. After a silence of about 3 seconds, when she is passing another instrument from the trolley to the ST, the CS continues the discussion, with a question that again suggests that he believes it is the term *mounted* that prompted the nurse's clarification ("You haven't heard the term 'mounted' before").

The nurse replies that she has not done this procedure before, as if saying, I don't know what "mounted tie" means in the context of *this* procedure. The CS, however, still seems to assume that it was the term "mounted tie" that the nurse was not familiar with ("But in surgery you never heard the term mounted before?"). The nurse then confirms that she *has* heard the term before ("Yeah yeah I heard"), but that she was not sure what the tie was to be mounted in. She mentions the example of the needle holder, prompting the CS to interrupt to say that he was asking for a "tie" (and not a stitch, which would be mounted in a needle holder). He then repeats his earlier question ("You never heard of the term mounted tie?"), produced alongside a side-to-side negating head movement), suggesting that he did not expect the SN not to know (the intonation does not emphasise this). The SN then confirms she has not ("no", produced alongside

a negating head movement), closing the exchange.

Then, after another passing of instruments, the discussion continues with an elaboration on the part of the CS. Not only does he describe the type of instrument that a mounted tie requested during this procedure should be mounted in ("long artery forceps"), he also explains why he needs ties mounted in that type of instrument simulating and describing the movement he needs to make ("that way when it when it's very deep you can go around the end of that"). In response, the nurse nods, signaling understanding.

In this example, the CS orients to the SN not knowing what the term "mounted tie" means, while the SN orients to not knowing what to mount a tie in. In other words, the exchange brings to the fore and challenges a working assumption about what this nurse knows. Having identified a wrong working assumption, the CS clarifies his request by making explicit what the surgical task is that he is facing, and why the instruments he suggests are apt for that task. In doing so he has reframed, momentarily, their joint clinical activity as an *educational* one, while the immediate task had already been achieved via an alternative route: the ST mounted the tie himself. Thus the CS creates a learning opportunity, embedded in actual practice, that facilitates future teamwork. By making explicit his assessment of the fit between the affordances of certain instruments and a concrete surgical task the SN is given an opportunity to learn, not only about instruments and their usage, but also about *this* CS's individual preferences (e.g. for a Lahey or a Sawtell), in *this* procedure. Moments after the extract discussed here he asks the CN (whom he has worked with for several years), to show the SN how to mount ties. While he does not ask for mounted ties again in this operation, this SN is now better prepared for future requests for a "mounted tie" in esophagectomy.

Minimal response: minimising "disruption"

In our second example (Figure 2), the SN is counting swabs with a CN. Someone is talking to the CS, when the CS requests for an anvil.

Figure 2: 'Anvil'

CS: Can I just have the (.) can I just have the anvil please,

(4.0)

SN: Sorry what did you want?

CS: Anvil.

(3.0)

SN: *Moves closer to consultant.* What did you want?

CS: The an vil. *Makes head nod.*

SN: *Moves closer to her trolley and gazes across the theater.*
Erm Jane, (.) where's Charlotte.

CS: *Turns to the trolley. Deposits instrument on trolley.* You don't know (what) the anvil is? *Points at an instrument.* This. Here.

SN: Oh this (yeah). *Picks up Anvil and passes the instrument to CS.*

An anvil, the shape of which only very loosely resembles that of the smith's anvil, is one part of a device frequently used in colo-rectal surgery in the Western world. In this case, it is used for an end-to-end anastomosis of the colon and the rectum following resection of diseased parts of the colon. The anastomosis is performed with a device (a stapling gun) that consists of a curved mechanical stapling instrument, which is introduced into anus, and the anvil, which is placed into the colon loop. When the two are "clicked" together a circular double staggered row of staplers joins the bowel, while a circular blade cuts through the closed stumps (Rothrock & Alexander 2012, p. 64). This is where the excerpt starts.

As the CS requests for the anvil, he is oriented to the patient's abdomen, while the SN is completing another task from behind her trolley. Right after the request for the anvil, the SN

shifts her gaze to the CS and sustains it for over three seconds. Then she asks, “Sorry what did you want?”, prompting the CS to repeat the original request, this time with a little more volume (“Anvil”). It is possible that the SN had not heard the original request, or was uncertain about what she had heard, as the CS was speaking away from where she was, while she was engaged in another task.

Following the CS repeating his request (“anvil”), the SN moves to position herself shoulder-to-shoulder with the CS, and repeats her request for clarification (“What did you want”). In response, the CS names the item he needs for the third time, this time pronounced slowly, as a bracketed repetition, with a pause between the two constituent syllables (“The an vil”), suggesting agitation. The SN then asks a CN to fetch the more experienced, coordinating CN, presumably, to seek clarification from her. The CS then moves away from the operating table to the instrument trolley behind him, and deposits the instrument he was holding on a tray, while saying, “You don’t know (what) the anvil is?” Both his actions and intonation signal growing agitation. He then points at the anvil on a trolley, and says, “This. Here”. Following this, the SN acknowledges the CS’s clarification (“Oh this”), picks the anvil up and passes it to the CS.

What happened here? Did the SN not hear the request well enough? After three articulations, including one produced as she had repositioned herself to listen from close by, this seems unlikely. Did she not know what an anvil is? As mentioned, it is a common device, and so is its name, in colo-rectal surgery. It is used at a particular moment in the operation, which typically occurs several hours into this operation (they are 2hrs15min in when the excerpt starts). This moment can be anticipated from the CS’s actions: once they have taken out the diseased part of the colon, the ends of the remaining colon need to be conjoined, leading to the request for the anvil. However, in some places, including many in the part of the world where this nurse worked before coming to London, the ends of the colon are still sewn together by hand. Thus the SN may

have been unfamiliar with this device, even if she had assisted in this procedure before in her previous work place.

Through participation in this operation the SN is learning what instruments are used, how and when, in this procedure, in this local ecology, with this CS. Yet the CS expects the SN to know, and continues to treat her question ("what did you want") as a hearing problem, even after the second repeat of the request did still not lead to provision of the anvil, when it was perhaps reasonable to assume that a different form of clarification was required. He does eventually provide that clarification, identifying the item through pointing, but only after the nurse had turned to the CNs to seek clarification.

Perhaps what prevented her from continuing to seek clarification from the CS was his publicly displayed agitation, and his persistence in treating the problem as a hearing problem. She might have anticipated that continuing to seek clarification would lead to more agitation, and not to any helpful clarification. Interestingly, a medical student can be seen moving towards the trolley with the anvil as soon as the CS has requested it, and points at it. Yet the nurse looks in a different direction, missing the helping hand. The CS does in the end provide a clarification, albeit one that merely serves to achieve the task at hand. Unlike the CS in Example 1, he does not make explicit what the instrument is for and why he needs it now.

Instead of reframing their activity pedagogically, the need for clarification is treated by this CS as a *disruption* of the *flow* of the operation. As discussed in the opening sections of this article, in the ideal world of surgeons, instruments are provided even before they have been asked for, without anyone having said anything, so that their course of actions is not interrupted. In the next best scenario, they ask for an instrument while staying focused on the operative field. The example discussed here is a far cry from that ideal world. Not only is the CS's course of action interrupted, he is also having to step away from the operative field in order to point out where the

anvil is, instead of describing what it looks like, which would seem a more difficult and less effective clarification strategy. The increasing frequency of occurrence of clarification requests in this stage of the procedure may have contributed to the reaction displayed by this CS. Only moments before the beginning of the extract discussed here a similar episode happened in much the same way.

Discussion

The examples render visible some of what a fully qualified and experienced theatre nurse, who had recently arrived from overseas, with no experience in assisting in these particular surgical procedures before, did not know. As well as that, they render visible what the surgeons expected her to know, what they did not know about her prior experience, and how they handle the need for clarification. This is illustrative of the *unsettling* effects of diffused, unpredictable professional experience and the creation of transient teams on nurse-surgeon collaboration at the operating table.

In both examples, surgeons oriented to the SN's not knowing what instruments they required (mounted tie and anvil). Yet their responses were different. The elaborate response from the CS in Example 1 suggests that he accepted, on this occasion, responsibility to "educate" the nurse about his requirements. The minimal response from the CS in Example 2 suggests that this surgeon did not take that responsibility on this occasion. Or, to put it differently, with the elaborate response the first CS positioned the SN as a learner, while the second CS, with his minimal response, did not. It might be argued that the elaborate response ought to be the preferred strategy since it creates learning opportunities from which both surgeon and nurse can benefit next time the instrument is required. At the same time, a potential tension must be recognised between educational concerns, and a concern to maintain a reasonable "flow" in the

operative work. When the frequency of occurrence of needs for clarification reaches a certain threshold, which will be different for each surgeon and situation, it will be experienced as disruption.

The second example shows what the effects are of surgeons experiencing the need for clarification as disruption. Features of the second CS's spoken realisation of the lexical item referring to the instrument, such as a pause between the syllables ("the an-vil"), and lengthening of the vowel in the first syllable, resemble that of "foreigner talk" sometimes used by native speakers responding to clarification requests from non-native speakers. These features position the SN, like the non-native speaker, as "incompetent". This is likely to discourage SNs from seeking further clarification, fearing it might lead to heightened tension. Indeed, in Example 2, the SN quickly turns to the CNs for that. Yet the experienced CN was not directly available, so that ultimately she had to rely on the CS to help out.

The examples raise sharp questions about the support required for a SN to learn to assist in new complex operations. Here the nurse was given little support, with no experienced colleague shadowing her as she was assisting in her first esophagectomy and one of her first sigmoid colectomies, in a hospital and country she had only started working in four to eight months earlier. Just as student nurses and medical trainees are mentored, nurses in this position ought to be guided by colleagues with more experience. The need to support trainees or newly qualified nurses may be readily recognised, yet the learning needs of experienced theatre nurses who are new to the hospital, procedure or surgeon are more likely to be overlooked. As well as nurses, surgeons have an important role to play in supporting these "newcomers": They are the ones introducing new instruments and developing preferences for and ways of using certain instruments.

Conclusion

We conclude by considering possible ways forward. One, if not *the* question arising from our discussion is whether policy should be aimed at reducing instability resulting from transient teams, so that the kinds of interactions discussed here might occur less frequently. Some staff surveys suggest it should. For instance, Flinn and Waring (2006) make a case for "promoting conditions that allow for stable teams" (p. 123), while Silén-Lipponen *et al*. (2005) suggest that "permanent teams could be a solution", with "stability of teams' perceived as being part of 'good working conditions'".

If nurses worked with a small number of different surgeons doing similar procedures for prolonged periods, agitation and discomfort is likely to be reduced, while the motivation to initiate the elaborate clarifications we saw in Example 1 might go up. All parties, including, nurses, surgeons and patients could benefit from that. However, while policies might be introduced aimed at creating more stable teams, other forms of mobility of staff cannot be controlled in the same way. High staff turn over, resulting from reduced stability of employment and increasing internationalization of the labor market for health professionals will continue to unsettle previously relatively stable team work.

Staff need to be prepared for dealing with these sources of uncertainty (Finn and Waring 2006). We propose that central to that preparation is to see the operating theatre always as a *learning* as well as a clinical environment, and to see both nurses and surgeons as learners, with a shared, inter-professional responsibility for sustaining that environment. In this perspective, the surgeons' knowledge and skills are in focus as much as the nurses', as are different bodies of knowledge, including generic knowledge of procedures and instruments, and specific knowledge of individual colleagues' ways of working. In a *learning* environment, uncertainty about what others know is anticipated. Requests for clarification are encouraged, and regarded as a sign of

professionalism, rather than a sign of incompetence. This resonates with the notion of "culture of safety", which is "aimed at encouraging any member of the OR team to surface and mitigate issues that can lead to patient harm" (Makary *et al*. 2006, p. 749). It also resonates strongly with the key themes that Gillespie et al. (2013) found in their analysis of team work: "building shared understandings through open communication", "managing contextual stressors in a hierarchical environment" and "intermittent membership influences team performance".

Recognizing that the operating theatre is a learning environment adds an important dimension to the notion of complexity. Complexity in health care is usually described in terms of inter-dependencies in collaborative work (see e.g. McKeon, Oswaks and Cunningham 2006). Our view is that in the operating theatre, multiple activities are simultaneously unfolding – the operating theatre is "poly-centric". The successful accomplishment of each of these activities is contingent on the accomplishment of all other activities. Some of the activities involve members of one profession only – say, nurses counting swabs – while other activities involve members of different professions –such as in the instrument pass. All these activities frequently involve new team members, with varying degrees of experience. In the "mono-professional" activities, it is clear who takes responsibility for the support of the learner, namely any one of the other members of the same profession: surgeons teach surgical trainees, nurses train student nurses, et cetera. In multi-professional activities, however, staff will need to take a different approach, and recognize their responsibility for the educational needs of staff from other "tribes".

While developing a safe learning environment is no easy matter, some recent interventions have yielded promising results (Bleakley *et al*. 2012). We found that detailed documentations of concrete instances of interactions between surgeons and nurses, such as the ones presented here, offer a powerful resource for staff development. We have discussed the cases in a range of contexts, including workshops for student nurses and multi-professional

round-table meetings, where they served as a shared point of reference, prompting debates that brought out different perspectives on unsettled teamwork ([AUTHORS]). The cases therefore not only render visible current practices around teamwork and communication, they also provide a common ground for critical evaluation and identification of opportunities for improvement, both inside and outside the research site.

Limitations

The study reports findings from one major hospital in London. The aim was to show the effects of unsettled teamwork in concrete instances of interaction and consider their implications; not to show the frequency of occurrence of these effects in a representative sample of urban hospitals. We focused on elective surgery. In emergency and trauma situations teams may well respond differently to new (but otherwise experienced) members of the team.

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