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Characteristics of team briefings in gynecological surgery

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ABSTRACT

Preoperative briefings have been proven beneficial for improving team performance in the operating room. However, there has been minimal research regarding team briefings in specific surgical domains. As part of a larger project to develop a briefing structure for gynecological surgery, the study aimed to better understand the current state of pre-operative team briefings in one department of an academic hospital. Twenty-four team briefings were observed and video recorded. Communication was analyzed and social network metrics were created based on the team member verbal interactions. Introductions occurred in only 25% of the briefings. Network analysis revealed that average team briefings exhibited a hierarchical structure of communication, with the surgeon speaking the most frequently. The average network for resident-led briefings displayed a non-hierarchical structure with all team members communicating with the resident. Briefings conducted without a standardized protocol can produce variable communication between the role leading and the team members present.

1. Introduction

Teams are now ubiquitous in high consequence environments. In the health care setting, teams—considered as team members with specific roles that are interdependent upon each other to complete their tasks (Salas et al., 1992)—are critical to providing safe patient care. Yet care teams can threaten patient safety when there is a mismatch or lack of awareness in team and individual goals, commonly caused by poor communication (Ashoori and Burns, 2013; Sutcliffe et al., 2006; Gawande et al., 2003; Gandhi, 2005). Across multiple domains, research has shown that higher performing teams will exhibit distinct patterns and structure to their communication (Bowers et al., 1998; Cooke et al., 2005; Kanki et al., 1989; Xiao et al., 2003). Teams that have difficulty with communication in the OR may be resultant from a lack of standardization and team integration (Awad et al., 2005). As a result, initiatives to promote team communication, such as team briefings have been studied (Henrickson et al., 2009).

Briefings have shown individuals and team benefits by facilitating effective communication (Einav et al., 2010; Whyte et al., 2008) and thus, have the potential to reduce medical errors (Awad et al., 2005; Lingard et al., 2008; Lyons and Popejoy, 2014; Russ et al., 2013). Pre-operative briefings provide a predictable opportunity to plan collaboratively and exchange information (Whyte et al., 2008; Papaspyros et al., 2010). This can include introductions–as the composition of OR teams can change throughout the day–and discussion of any deviations in routine procedures so that a shared situation awareness of the case is established (Russ et al., 2013; Whyte et al., 2008). Initiating structured communication, such as pre-operative briefings, around critical events for operative teams can alleviate cognitive workload and reduces breakdowns in team communication (Wadhera et al., 2010) by way of interactive team cognition (Cooke et al., 2013). Yet, their adoption in the healthcare setting has been slow (Henrickson et al., 2009).

On the other hand, the WHO Surgical Safety Checklist has experienced widespread adoption and acclaim in a short amount time (Weiser et al., 2010). Since the launch of the WHO Surgical Safety Checklist over 4000 hospitals across the world have adopted and actively use the checklist in their facility (Walker et al., 2012) and its use is endorsed by national and international healthcare safety organizations (Institute for Healthcare Improvement, 2013; The Joint Commission, 2012; World Health Organization, 2008). However, subsequent research findings have identified weaknesses with the implementation fidelity of the WHO surgical safety checklist suggesting that the checklist is not

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always applied as intended (Levy et al., 2012; Rydenfält et al., 2013) and used with varying compliance (Fourcade et al., 2012; Henderson et al., 2012; Levy et al., 2012; Rydenfält et al., 2013). Although checklists have quickly become the standard of care in the operating room (McConnell et al., 2012), there are still weaknesses and missed opportunities to increase communication and improve shared understanding and team coordination, which could be accounted for by implementing a team briefing prior to the surgical procedure.

Despite briefings generally being accepted as beneficial, their lack of implementation may be due to a dearth of specialized and standardized protocols. Henrickson et al. (2009) developed a team briefing protocol specifically for cardiovascular surgery using focus groups with surgical team members. Following implementation, there was a significant decrease in patient-related errors and equipment issues, and increase in procedural knowledge and miscommunication events (Henrickson et al., 2009). That study introduced the need and provided rationale for surgery specific protocols. Based on the benefits provided by briefings in general, surgery-specific protocols would likely increase perceived relevance for team members and thus, better support team cognition, shared mental models, and situational awareness for that given surgery. Additionally, briefing information that is relevant may be more effective in preventing errors in any subsequent surgery by that team.

Overall, a solid foundation of work has been building in the field of surgical team briefings. However, there is still variation in the approaches and methodology for conducting the briefings. Whereas the research that has been accomplished on briefings has focused mostly on compliance and feasibility of implementation, there has been significantly less research regarding team briefings in specific surgical domains. No research to date has related specific characteristics of team briefings (e.g. who led the briefing, who was present, who contributed, how long it lasted, etc.) to the quality of teamwork (Russ et al., 2013). Understanding how the quality of a team briefing and variations in practice impact team-related outcomes is necessary for designing effective methods (e.g. checklists or protocols) to improve the process. Our previous work has addressed the methodological process to conducting research on operative briefings (Law et al., 2014) as well at the informational needs of teams and individuals for briefings in gynecological surgery (Hildebrand et al., 2014). As part of a larger project to develop a model of team briefings (Hildebrand et al., 2014), the purpose of this study was to understand the characteristics of pre-operative team briefings and how it relates to the quality of teamwork while situated in the gynecological surgical domain.

2. Methods

2.1. Setting and participants

This observation-based, prospective study was conducted in the surgical gynecology department of a quaternary care academic hospital located in the Midwest. Participants were members of the surgical teams, which included the following roles: surgeon, resident, anesthesiologist, certified registered nurse anesthetist (CRNA), circulating nurse (RN), certified surgical assistant (CSA), and certified surgical technologist (CST). Because anesthesiologists in this department are responsible for overseeing multiple operating rooms at a time, the CRNA was considered the “in-room provider” for the anesthesia team. The observed surgical procedures included minimally invasive laparoscopic surgeries, general open surgeries, and robotic surgical procedures. The Institutional Review Board approved this study.

2.2. Briefing procedure

Team briefings for each operating room (OR) are conducted in the morning prior to all gynecological surgical cases. During the team briefings, all of the surgical cases that take place in that specific OR for the day are reviewed. For this study, a surgical case was defined as the surgical procedures for an individual patient, and surgical teams often completed 1–3 cases per day. Gynecological surgery team members often varied between cases and within cases (due to handoffs, shift changes, etc.), so different teams and team members were observed throughout the data collection period. While the team briefings had mandated start times for when the team briefing should occur, there was no formal protocol instructing teams how to appropriately conduct the briefings. Briefings are not currently implemented across all departments at this institution; however, this department had conducted team briefings for the past two years.

2.3. Gaining buy-in

Prior to data collection for this study, the principal investigator (RCB) and research team met with the larger department for each role on the surgical team (e.g. Nursing, Anesthesiology, etc.) during scheduled morning meetings (Law et al., 2014). At these meetings, a presentation was given regarding the research objectives and plans for data collection, and surgical team members were able to raise questions and concerns about the nature of the research. Clarifying the purpose of the research and data collection plans to participants helped alleviate concerns over use of the videos for briefing evaluation.

2.4. Research protocol

On observation days, experienced human factors researchers arrived to the OR in the morning in time to video-record the team briefing. Briefings were held either outside of the operating room in the hallway or inside the operating room, just prior to the start of a surgical procedure. At the team briefing, the researchers would be introduced and remind the surgical team of the research objectives. When the team briefing began, the researcher held the camera and video-recorded the entirety of the team briefing (see Fig. 1). Following the team briefing, all surgical team members assigned to the OR being observed were asked to complete a survey that recorded demographic information.

2.5. Data analysis

Descriptive statistics were performed to calculate means (*M*), medians (*Mdn*), and standard deviations (SD) of team members present

Fig. 1. Hero3 Black Edition GoPro Camera used for observational data collection.

at the briefings, briefing duration, and number of cases discussed. From the team briefing videos, communication flow was identified by coding instances of communication between surgical team members. For each communication instance, who talked to whom was noted. This data was then submitted to Node XL, an open-source, network analysis and visualization software add-on package for Microsoft Excel. Within Node XL, directed networks were created for each team briefing event and various metrics were calculated for each network.

Graph density, reciprocated edge ratio, in-degree centrality and out-degree centrality were used as metrics of analysis for team briefing communication. Graph density is "the ratio that compares the number of edges in the graph with the maximum number of edges the graph would have if all the vertices were connected to each other" (NodeXL, Microsoft Excel). Because a positive relationship between the quantity of communication and improved team-related outcomes has been identified (Bowers et al., 1998; Cooke et al., 2005; Cooke et al., 2008), it was assumed that greater density would be representative of better communication and lower density would represent poorer communication.

Reciprocated edge ratio refers to the percentage of outgoing links from one node to another that has one coming directly back toward it (e.g., surgeon talks to nurse, nurse talks to surgeon). Centrality is a measure presumed importance of a node within a graph (Borgatti, 2005). The simplest measure of centrality is degree centrality, defined as the number of links connected to a node. This metric was chosen due to its high correlation among alternative measures of centrality (e.g., closeness, betweenness, Eigenvector, page rank, etc.). Because we are concerned about directional communication (i.e., who talked to whom), we calculate in-degree and out-degree centrality here. In-degree measures the number of links to a particular node, whereas out-degree refers to the number of links from a particular node.

The data was also averaged across all briefings to create representative 'average' networks of communication among teams during all briefings, and briefings led by either surgeons or residents. In all networks, each node (or vertex) represents a role on the surgical team (e.g. surgeon, anesthesiologist, resident, CRNA, RN, CSA, CST). The size of the node indicates the frequency with which that role on the surgical team communicates (e.g. larger node = more communication) in general. A link between each node suggests there is, on average, at least one instance of communication between the two nodes (e.g. roles) for that briefing. The weight (e.g. thickness) of the link between two nodes indicates the frequency with which one role communicates with another role (e.g. thicker link = more communication).

3. Results

The observational data were collected over a five month period, which yielded data for 24 briefings and 45 surgical cases. There was not a day that a researcher observed when a briefing did not occur. Observed briefings were typically held in the hallway (n = 19, 79%) and less often were held in the operating room (n = 5, 21%). Briefings lasted an average of 3 min and 38 s (*SD* = 0:01:19, *Mdn* = 0:03:38) and typically covered information for one (12.5%), two (70.8%), or three (16.7%) individual cases, depending on the operating room schedule for that day. Individual case discussions lasted an average 1 min and 42 s (*SD* = 0:00:37, *Mdn* = 0:01:25).

3.1. Composition of team briefings

On average, the team experience for those observed at the briefings was 12.37 years (*SD* = 11.51; *Mdn* = 13.25 years). Eighty-three percent of the surgical team members, on average, were present for the briefing (Table 1). Attendance was highest by individual team roles including the surgeon (92%), RN (100%), and CST (96%); the anesthesiologist role attended briefings less than half the time (42%). Often additional people were present at the team briefing (*M* = 3.0, *SD* = 1.66, *Mdn* = 3). These people often included core personnel, nurse managers, additional residents or CRNAs, or visiting students.

Table 1
Characteristics of the surgical briefings, including team roles present, leading role, and mechanism used to conduct briefing.

Team roles	Number of times present at briefing (n,%)
Surgeon	22 (91.7%)
Resident	20 (83.3%)
CRNA	20 (83.3%)
RN	24 (100%)
CSA	21 (87.5%)
CST	23 (95.8%)
Anesthesiologist	10 (41.6%)

Briefings were predominantly led by the surgeons (n = 18, 75%). In four of the six briefings led by residents, surgeons were still present and participated in the briefing. Another six briefings (25%) were led by two different surgeons who were overseeing separate cases consecutively in the same operating room. These were unique briefings as the surgeon and resident will change from one case to the next, however the rest of the surgical team will remain the same. Briefing leaders, regardless of role, relied on either a case schedule document (n = 18, 75%) or their memory (n = 6, 25%) to support the information they were providing at the briefing. Essentially, the case schedule is unique to each OR and contains the scheduled cases for that day and case-specific information such as the patient name, ID number, age, indication (e.g. why they are doing the procedure, allergies), procedure name, special equipment, and notes on the anesthesia protocol for that procedure.

At the start of the briefing, introductions only occurred 25% of the time. When they did occur, it was common for the surgeon to initiate the introductions. Introductions were informal with each team member presenting themselves by their first name and role for the day (e.g. "Hi, I'm Dr. X and I'm the surgeon", or "I'm Mary and I'll be the nurse in the room").

3.2. Communication networks

Table 2 shows graph density, reciprocated edge ratio, in-degree centrality and out-degree centrality for the overall average, surgeon led average and resident led average communication networks. To begin, directed individual communication networks were generated for each of the 24 briefing episodes. To construct these individual networks, a link was included between two nodes if and only if there was at least one communication event from one node to another during that specific briefing. The average individual directed communication network, from the 24 briefings observed, had a communication density of 0.46 (*SD* = 0.18, *Mdn* = .43).

Next, an aggregate directed network was constructed by averaging (calculating a mean) the data from each of the 24 briefing episodes. (Fig. 2). This network reveals that only the surgeon talked to every other role at least once on average across the 24 observed briefings. On average, the resident spoke to every other role except for the anesthesiologist at least once per briefing. Only the anesthesiologist did not communicate with any other role at least once per briefing. Thus, the structure of the network overall reveals a hierarchical nature to the team briefing communication on average, with the briefing leader (e.g. surgeon or resident) dictating most of the communication to the other roles on the team. This hierarchical structure is evidenced by a reciprocated edge ratio of 0.33, meaning that of the people who spoke to others in the network, only 33% of them spoke back.

When comparing the communication networks for the individual briefings with the greatest density and the least density, there were clear differences in communication structure. In the directed network for the briefing with the greatest communication density (Fig. 3A;

Table 2
In-degree and out-degree centrality measures for each team role in briefings.

Team roles	Average		Surgeon-led		Resident-led	
	In-degree	Out-degree	In-degree	Out-degree	In-degree	Out-degree
Surgeon	1	6	1	6	2	5
CRNA	2	0	1	0	3	1
ANT	1	0	1	0	1	0
Resident	2	4	1	0	5	6
CST	2	0	1	0	3	2
CSA	2	0	1	0	2	2
RN	2	2	1	1	3	3

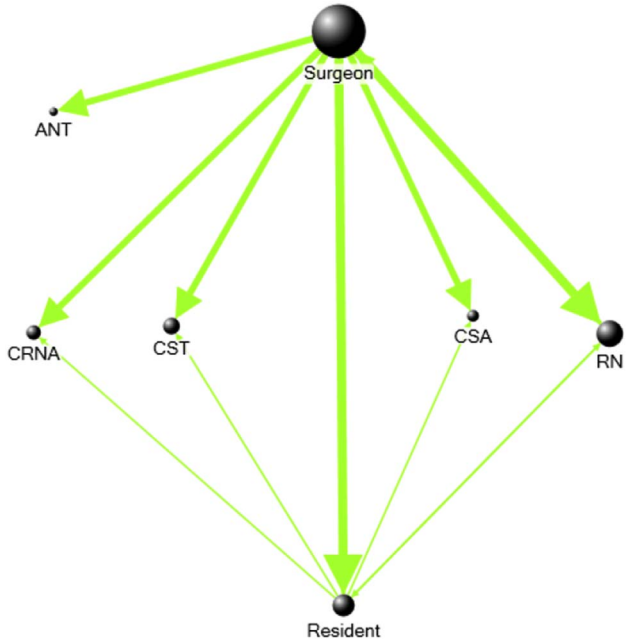

Fig. 2. Average overall communication network for briefings.

graph density = 1.00), the resident led the briefing. However, the surgeon still spoke the most frequently, as indicated by the size of the surgeon node, and each team member talked to every other team member at least once; except for the anesthesiologist, who was not present at the briefing. In the directed network for the briefing with the least density (Fig. 3B; graph density = 0.21), the surgeon led the briefing and clearly dominated the communication. While the resident, anesthesiologist, and RN did communicate back with the surgeon at least once, no team members communicated with one another during the briefing.

3.3. Surgeon versus resident-led briefings

Directed networks of average communication were developed for both surgeon- and resident-led briefings. During the 18 surgeon-led team briefings (Fig. 4A; graph density = 0.17), reciprocated edge ratio = .29 the surgeon appears to dominate the conversation, with only the CRNA, RN, and CST communicating back at least once on average across all 18 briefings. Further, there is no communication among any of the team members.

In contrast, during the six resident-led team briefings (Fig. 4B; graph density = 0.45, reciprocated edge ratio = 0.5) all team members communicated back with the resident at least once on average. Even though the resident led the briefing, the surgeon spoke more frequently than the resident. Communication was observed among all team members on average, except for the anesthesiologist.

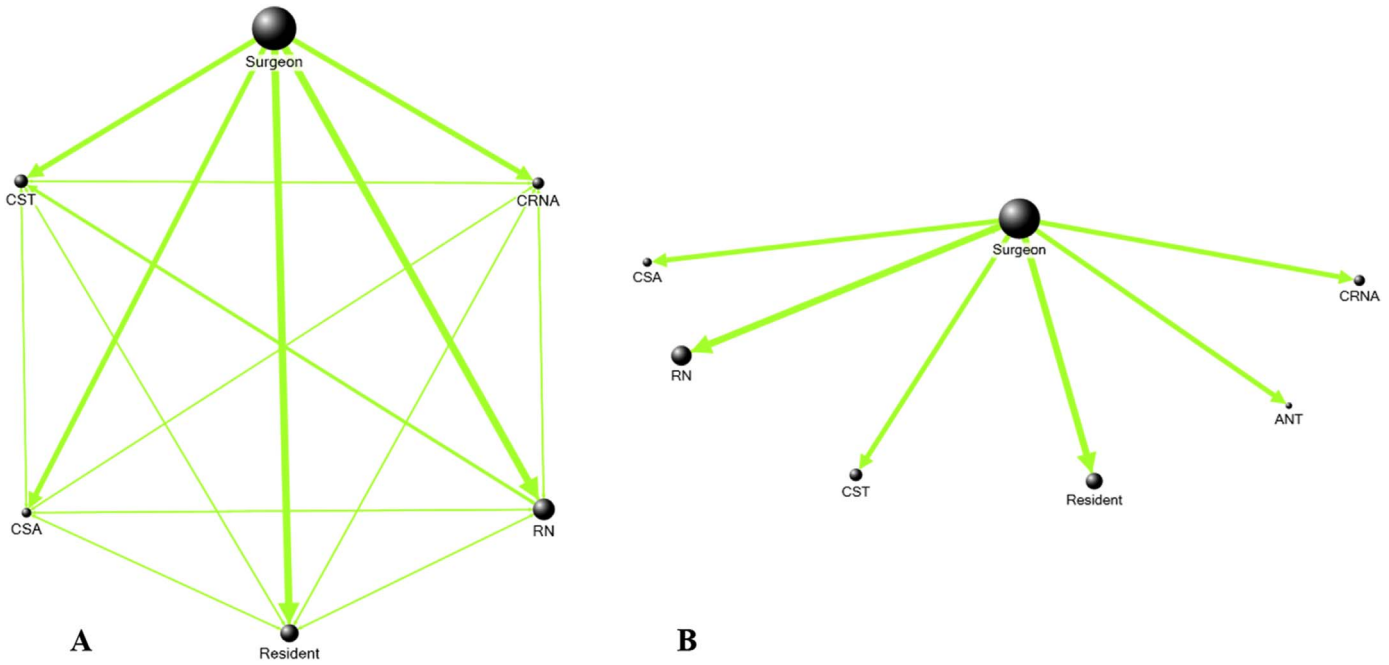

Fig. 3. Networks with (A) the largest communication density (1.00), and (B) smallest communication density (0.21).

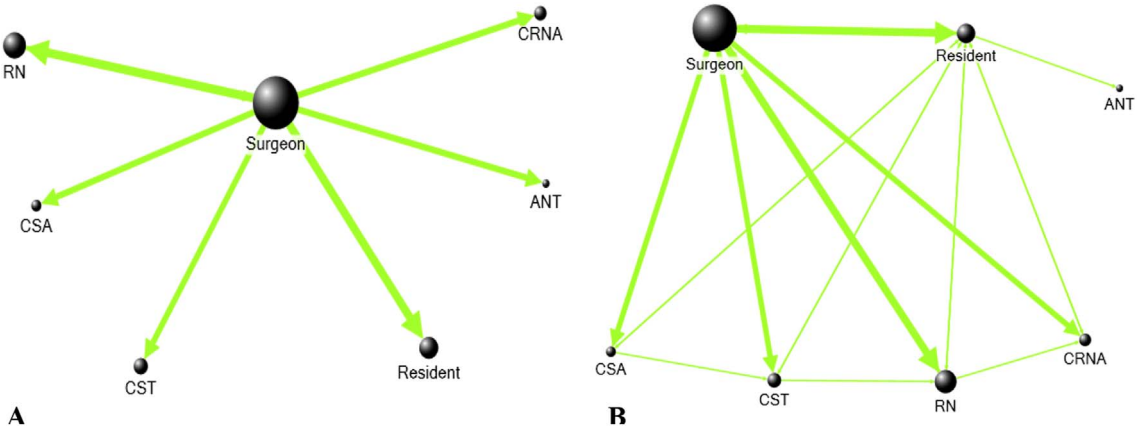

Fig. 4. Networks of average communication during briefings led by (A) surgeons, and (B) residents.

Additional analysis of the briefing communication revealed a mean number of questions asked per briefing was approximately 7 (SD = 4.08, Mdn = 6). On average, 27.53 items (SD = 7.57, Mdn = 27) were discussed at the team briefings. Per surgical case, the mean items discussed was 13.20 (SD = 4.91, Mdn = 11.50). Examples of items discussed included patient identifiers, co-morbidities, steps of the surgical plan, special equipment needed, surgeon preferences, and medications.

4. Discussion

In this study, 24 team briefings for 45 gynecological surgery cases were video-recorded to analyze briefing characteristics and communication flow. Surgical cases included laparoscopic, open, and robotic surgeries, with both surgeons and residents leading the briefings. Most team members were present at the briefings; however, variations in roles present and leading the briefing changed the communication networks developed.

4.1. Team briefing composition

Team briefings occurred every scheduled surgical day over the duration of data collection. Briefings were typically led by the surgeon, and well attended by all team members, except for the anesthesiologist, who attended less than half of the time. The briefing completion rate of 100% is higher than that observed in the literature (Khoshbin et al., 2009). The fact that briefings always occurred and were well attended may have been due to the fact that briefings have been a departmental practice for the past two years. Further, the established start time for briefings set an expectation for where team members should be at that time.

The observed briefings covered one to three surgical cases and lasted, on average, 3 min and 38 s. An average of 1 min and 42 s was spent discussing each individual case, which fits with recommendations from the literature, such as the 2-Minute OR Briefing (Makary et al., 2007). While shorter briefing durations also align with team preferences identified previously (Hildebrand et al., 2014), it is important to consider how variations in briefing duration affect other team briefing characteristics. For example, putting a "time limit" on briefings may impede opportunities for communication and miss knowledge gaps among the team (Whyte et al., 2008).

The communication of team briefings revealed a number of variations. Introductions only occurred in 25% of the briefings and half of the occurrences were attributed to an observer effect, whereby introductions were initiated to present the researchers. This suggests that without the presence of observers, introductions may be far less in actual practice. Yet, recommendations for introductions were present in the literature (Russ et al., 2013) and team members viewed introductions as a "critical step" in the briefing process (Hildebrand et al., 2014).

4.2. Communication networks

Findings from the network analysis of communication revealed that the average team briefings exhibited a hierarchical structure to communication, with the surgeon speaking the most frequently and dominating the conversation. On average, team members only communicated directly with the surgeon or resident and did not speak to each other during the briefing. The average graph density of individual team briefing communication networks was 0.46, with the lowest density at 0.21, and the highest density at 1.00 suggesting a wide range of communication styles occurred at the briefings.

4.3. Surgeon versus resident-led briefings

When comparing the average communication networks for resident-led briefings with the networks for surgeon-led briefings, there were drastic differences in the density and structure of the graphs. The average communication network for surgeon-led briefings displayed a hierarchical structure, with only three team members talking back to the surgeon and no other team members talking to each other. Further, the surgeon-led briefing network had a density of 0.21 which was the lowest observed individual team briefing communication network density. Weaver, et al. (2010) identified a similar phenomenon when surgeons without teamwork training led briefings and team members were less willing to speak up and communicate during that time. This may have been a result of the hierarchical nature of health care teams, or that the surgeons likened briefings to a checklist rather than a safety tool (Khoshbin et al., 2009). Makary et al. (2006) corroborate such theories in their survey study of surgeon and nurse perspectives on teamwork. Surgeons described good collaboration as when nurses can anticipate and follow instruction, while nurses described it as respecting their input (Makary et al., 2006). Nonetheless, briefings should allow for open communication regardless of hierarchical culture so as to not risk optimal patient care (Keenan et al., 1998; Knox and Simpson, 2004).

On the other hand, the average network for resident-led briefings displayed a non-hierarchical structure, where all team members communicated with the resident at least once per briefing and communicated with each other. As previously mentioned, denser graphs are assumed to equate to better communication; thereby, residents had better communication at their briefings. In our previous study interviewing team member preferences, there was a strong partiality among team members for surgeon-led briefings (Hildebrand et al., 2014). It was unclear exactly why team members talked more during the resident-led briefings. Team members could have been asking more

questions for clarification or felt less fearful of speaking up when the surgeon was not leading. Alternatively, staff may have been prompting the junior surgeon due to their experience. However, motivations for either style of leadership were not evaluated and should be considered in the future.

4.4. Limitations

While this study revealed a number of potentially impactful findings, caution should be taken before extrapolating these results. The findings are based on a small number of observed briefings and surgical cases at a single institution that were available as a sample of convenience. While convenience sampling may be criticized for biasedness and unrepresentative of the larger population, in this case it provided an opportunity to study real teams in context—providing validity that cannot always be achieved in laboratory studies. Further, this research answers the call for more empirical work studying teams "in the wild" (Salas et al., 2008). As little information is still known about how teams interact in real, live, uncontrolled environments (Salas et al., 2008), this research was critical for understanding how surgical teams communicate in team briefings. Observations were always announced to the surgical team, yet it is possible that the mere presence of the observer confounded the normal surgical work flow for that team. For example, this was observed during the briefings when the surgeon would begin introductions as a way to present the researcher observing for the day. Additionally, this study did not take into account team member familiarity, case familiarity, or team member actions during briefings. Team members took notes on occasion related to necessary equipment needed, but this was not noted during the data collection process. Such topics should be considered in future briefing studies. Finally, surgical teams and individual team members were not tracked, and with considerable diversity in the participant group (e.g. multiple surgeons, multiple residents), it was not possible to conduct repeat observations of completely identical surgical teams.

5. Conclusion

The value of pre-operative team briefings has been established, but limited knowledge exists on the needs and current process of specialized surgical briefings. Understanding the characteristics of gynecological surgery team briefings conducted "in the wild" demonstrated variability in briefing quality when conducted without a protocol. Surgery-specific protocols should be developed with knowledge of and with respect to roles leading briefings, which may impact the dynamic and communication style of the briefings. Good briefings should lead to greater patient safety.

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