Perceptions of Barriers to Effective Surgical Handover: A Multi-Disciplinary Survey

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Abstract

Objective: We aimed to examine perceptions of barriers to effective surgical handover among Healthcare professionals at Department of Surgery, Mayo Clinic, Rochester.

Methods: In 2012 healthcare providers across 10 surgical specialties were surveyed.

Results: The overall response rate was 48%. 96% agreed that it is an important component of patient care while 74% agreed that an electronic handover tool should be available. There was a significant difference in the views with respect to the need for an electronic handover tool (MLPs vs. residents: 85% vs. 63%: p=0.01). 62% of staff strongly agreed that education is necessary compared to 26% of residents (p=0.0007). 75% of respondents agreed that time constraints is a relevant barrier (p=0.091). 76% of respondents felt that a standardized process could be designed for use across the entire Department of Surgery.

Conclusion: It is evident that a module of education and training followed by establishment of a process of handover with standardized structure and content will allow the authors to establish a purpose-built system to optimize surgical handover and improve patient safety.

Keywords: Surgical Handover; Barriers; Surgery

Introduction

The enactment of resident duty hour restrictions by the Accreditation Council on Graduate Medical Education (ACGME) in 2003 in the United States was part of a global move to reduce the workload of doctors in training [1]. A consistent body of evidence confirmed that existing work practices were unsafe for the care giver (doctor) and the care recipient (patient). The aim of this international legislation concerning duty hour restrictions was to promote patient safety and preserve the well-being of the doctor. These restrictions have produced unanticipated novel challenges. These include shift-work mentality, night-float systems, fragmentation of healthcare provision, and abolition of apprentice-model of training and surgical handover [2-4]. The transmission of patient information and responsibility (handover) is a pervading problem. Kitch et al. [5] reported that 59% of residents report at least one sentinel event based on problematic handover during their previous rotation. Further ACGME duty hour restrictions became effective in July 2011 while the European Working Time Directive (EWTD) as being implemented throughout Europe with variable intensity [6].

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) reported on 15 years of sentinel events incorporating 6244 events. 91% of these were due to communication errors. There are many other survey-based descriptive datasets confirming the magnitude of this issue. Handover create an opportunity for error because the process is often characterized by missing, inaccessible or forgotten information. Clinicians often fail to allocate enough time to transfer patient data appropriately. Consequently recipients may not get a full, accurate picture of the patients' condition which leads to adverse outcomes. Arora et al. [7] highlighted that handover communications are affected by content omission related to medications, investigations, consults or active medical problems. Failure-prone communications are largely attributable to lack of face-to-face communication, double sign-outs and illegible/incomprehensible medical notes.

Table 1:

Category	Attending surgeon (N=113)	Residents (N=162)	Midlevel providers (N=94)
Response rate [No. (%)]			
Department	54 (48)	70 (43)	55(58)
Cardiovascular	5 (45)	3 (30)	15 (65)
General surgery	16 (48)	32 (36)	20 (63)
Colon & rectal	8 (80)	4 (100)	3 (27)
Transplant	3 (38)	4 (80)	0 (0)
Pediatric	4 (100)		6 (60)
Thoracic	3 (60)	7(87)	7 (70)
Vascular	3 (50)	7(100)	2 (100)
Gynecology	6 (29)	4 (80)	0 (0)
Maxillofacial	4 (80)	4 (33)	0 (0)
Plastic	2 (20)	5 (71)	2 (40)
Resident level			
PGY-1		20	
PGY-2		11	
PGY-3		10	
PGY-4		9	
Chief resident		6	
Fellow		14	

Using the example of an elective laparoscopic sigmoid colectomy within an enhanced recovery program the average length of stay would be 5 days. It is estimated that this inpatient stay will involve a minimum of 15 resident handover to comply with duty hour restrictions. This has resulted in the requirement of multiple care handovers within a 24-hour period which may translate into loss of continuity of care. The gap in care provision in North America is supplemented by hospitalists who provide patient care within a timeframe which will overlap resident shift changes. Apart from the perceived threat to patient safety other consequences of an ineffective handover include delays in treatment and ordering of tests, incongruence in patient data and increased length of stay.

Key strategies have been proposed to overcome these perceived barriers to effective handover. These include standardization of the tool and process, use of communication mnemonics including SBAR (Situation, Background, Assessment and Recommendation) and incorporation of dedicated education sessions to provide better training. It is well recognized that the ideal model of handover is face-to-face facilitated by electronic patient data. Similarly, a dedicated location is necessary which all members of the multidisciplinary team can access to discuss/identify core components of patient care and have an electronically accessible framework encompassing the relevant information bundles for all team members. It should be carried out at designated time-points which are 'protected' from interruptions. It should involve the most senior departing care giver and the oncoming care provider. It should include information relevant to the patient's likely clinical progress over the subsequent shift without being exhaustive. It should be delivered in an environment conducive to questioning and comprehension.

Although prior research provides a strong foundation to understanding the problems associated with the handover communication there is a paucity of literature on the nature of these barriers. It is difficult to develop strategies to improve a situation when the key components of the problem are not fully understood. We, like others, have recognized a gap in the medical literature and also in our own clinical practice in the area of surgical handover. In recognizing the threat of inadequate handover to patient safety we embarked on a process of standardizing and optimizing patient handover at our institution. As we embarked upon a departmental practice initiative to implement clear process guidelines for surgical handover we evaluated the perception of the stakeholders to determine what were the specific barriers to effective handover that existed in the institution. The data acquired will be used to guide our process development.

Methods

Study design

This observational study involved a web-based survey with a series of open and closed questions to identify the barriers to effective handovers as perceived by all members of clinical care provision in the Department. The study was approved by the institutional review board (IRB).

Study setting and population

This research was conducted at the Mayo Clinic (Rochester, Minnesota). The research was conducted in conjunction with the Surgical Education Research Fellowship (SERF) linked to the Association of Surgical Education (ASE). All residents, staff surgeons and midlevel providers within the Department of Surgery were invited to participate in an online survey. An email link to a structured survey was sent with a cover letter emphasizing the magnitude of this challenge to patient safety. The survey consisted of numerous questions structured in the following categories: participant demographics, handover tool, handover process and compliance with the process of handover. The surveys were customized to each group and included Likert-scaled questions, some simple yes/no answers and open-ended questions. The Web-based survey was assessed by healthcare researchers experienced in survey design and piloted on a focus group of surgical residents, staff surgeons and midlevel providers to ensure comprehension of the purpose of the survey, language, clarity of the questions and ease of use. Answers were assessed to ensure that the design would correctly address the key question being posed. An initial cover letter was sent to all potential participants 2 weeks prior to release of the survey detailing the date of release and the importance of this survey. The survey was accessible from September 15th until October 29th, 2012. E-mail reminders were sent to all participants after 2 weeks emphasizing the importance of

Table 2: Please rate your level of agreement or disagreement with the following statement.

	Staff Surgeons (N=54)	MLPs (N=55)	Residents & fellows (N=70)	Total (N=179)	p value
A well-executed surgical handoff is an important component of patient care					0.0041[1]
Disagree[2]	2 (3.8%)	1 (1.8%)	3 (4.3%)	6 (3.4%)	
Neither agree nor disagree	0 (0.0%)	0 (0.0%)	2 (2.9%)	2 (1.1%)	
Agree[3]	52 (96.3%)	54 (98.2%)	65 (92.9%)	171 (95.6%)	
There should be formal education and training in performing appropriate surgical handoffs					0.0007[1]
Disagree	4 (7.6%)	2 (3.7%)	7 (10%)	13 (7.4%)	
Neither agree nor disagree	5 (9.4%)	8 (14.8%)	15 (21.4%)	28 (15.8%)	
Agree	44 (83.1%)	44 (81.5%)	48 (68.6%)	136 (76.9%)	
There should be a designated place and time for handoffs to occur					0.0040[1]
Disagree	9 (16.7%)	2 (3.8%)	9 (12.9%)	20 (11.2%)	
Neither agree nor disagree	15 (27.8%)	7 (13.0%)	14 (20.0%)	36 (20.2%)	
Agree	30 (55.6%)	45 (83.3%)	47 (67.1%)	122 (68.5%)	
An electronic-based handoff tool should be available to facilitate communication between all members of the healthcare team					0.0105[1]
Disagree	3 (5.6%)	4 (7.6%)	11 (15.7%)	18 (10.2%)	
Neither agree nor disagree	9 (16.7%)	4 (7.5%)	15 (21.4%)	28 (15.8%)	
Agree	42 (77.8%)	45 (84.9%)	44 (62.9%)	131 (74%)	
Is there a designated handoff system in the division you work in					0.5136[1]
Yes	22 (40.7%)	30 (54.5%)	32 (45.7%)	84 (46.9%)	
No	25 (46.3%)	17 (30.9%)	26 (37.1%)	68 (38.0%)	
Don't Know	7 (13.0%)	8 (14.5%)	12 (17.1%)	27 (15.1%)	

[1]Kruskal Wallis
[2]includes strongly disagree & disagree
[3]includes strongly agree & agree

the topic and how the responses may shape the future of surgical handover at this institution. An additional web-link was sent to all potential participants.

Data analysis

Information was collated into an anonymous database. Statistical differences between the 3 groups studied were assessed using Chi-squared analysis. P values ≥0.05 were considered not significant.

Results

The overall survey response rate was 179/370 (48%). This surveyed population consisted of (number): midlevel providers/hospitalists (94), staff surgeons (113) and residents (162). The response rate for midlevel providers (MLPs), staff and residents was 59%, 48% and 43% respectively. Characteristics of the respondents are illustrated in Table 1. When asked a series of closed questions about surgical handover 96% agreed that it is an important component of patient care, 74% agreed that an electronic handover tool should be available to facilitate effective handover and 68% agreed that there should be a designated time and place for handover. There was a significant difference in the views of MLPs and residents with respect to the

need for an electronic handover tool (MLPs vs. residents: 85% vs. 63%: p=0.01). 47% of those who responded claimed that an electronic handover tool existed in their department while 38% said there was no existing system and 15% did not know. There was a significant difference of opinion regarding the need for formal education and training in surgical handover. 62% of staff surgeons strongly agreed that it was necessary compared to 26% of residents (p=0.0007) (Table 2).

Barriers to handover

25% of staff surgeons strongly agreed that the absence of a dedicated electronic tool was one of the most relevant barriers to surgical handover. 11% of MLPS and residents felt that it was the most relevant (p=0.014). Similarly 32% of staff surgeons felt the absence of a standardized process was very relevant compared to 21% of residents (p=0.015). Overall, 75% of respondents agreed that time constraints is a relevant barrier and this did not vary between differing groups (p=0.091). Unwillingness among staff surgeons to release residents from clinical duties to perform handover was perceived as a very relevant barrier in only 12% with no significant differences between the groups (p=0.1) (Table 3).

Table 3: On a scale of 1 to 5, please indicate the relevance of the following barriers to an effective surgical handoff with 1 being the 'least relevant' and 5 being the 'most relevant'.

	Staff Surgeons (N=54)	MLPs (N=55)	Residents & fellows (N=70)	Total (N=179)	p value
Lack of a dedicated electronic handoff tool					0.0144[1]
1	6 (11.5%)	9 (16.4%)	17 (24.3%)	32 (18.1%)	
2	9 (17.3%)	9 (16.4%)	19 (27.1%)	37 (20.9%)	
3	12 (23.1%)	14 (25.5%)	15 (21.4%)	41 (23.2%)	
4	12 (23.1%)	17 (30.9%)	11 (15.7%)	40 (22.6%)	
5	13 (25.0%)	6 (10.9%)	8 (11.4%)	27 (15.3%)	
Time constraints					0.0907[1]
1	1 (1.9%)	0 (0.0%)	4 (5.7%)	5 (2.8%)	
2	2 (3.7%)	1 (1.8%)	8 (11.4%)	11 (6.1%)	
3	6 (11.1%)	10 (18.2%)	12 (17.1%)	28 (15.6%)	
4	24 (44.4%)	20 (36.4%)	23 (32.9%)	67 (37.4%)	
5	21 (38.9%)	24 (43.6%)	23 (32.9%)	68 (38.0%)	
Additional clerical workload					0.0801[1]
1	2 (3.8%)	3 (5.5%)	6 (8.6%)	11 (6.2%)	
2	8 (15.1%)	15 (27.3%)	9 (12.9%)	32 (18.0%)	
3	13 (24.5%)	15 (27.3%)	14 (20.0%)	42 (23.6%)	
4	21 (39.6%)	15 (27.3%)	22 (31.4%)	58 (32.6%)	
5	9 (17.0%)	7 (12.7%)	19 (27.1%)	35 (19.7%)	
Lack of a standardized process					0.0149[1]
1	1 (1.9%)	6 (10.9%)	7 (10.0%)	14 (7.9%)	
2	2 (3.8%)	7 (12.7%)	12 (17.1%)	21 (11.8%)	
3	13 (24.5%)	12 (21.8%)	20 (28.6%)	45 (25.3%)	
4	20 (37.7%)	16 (29.1%)	16 (22.9%)	52 (29.2%)	
5	17 (32.1%)	14 (25.5%)	15 (21.4%)	46 (25.8%)	
Lack of formalized education on effective handoff					0.0023[1]
1	4 (7.4%)	7 (12.7%)	12 (17.1%)	23 (12.8%)	
2	6 (11.1%)	10 (18.2%)	16 (22.9%)	32 (17.9%)	
3	11 (20.4%)	18 (32.7%)	21 (30.0%)	50 (27.9%)	
4	17 (31.5%)	14 (25.5%)	10 (14.3%)	41 (22.9%)	
5	16 (29.6%)	6 (10.9%)	11 (15.7%)	33 (18.4%)	
Consulting staff unwilling to excuse resident from clinical duties (operating room or clinic) to participate in the handoff session					0.1021[1]
1	8 (15.1%)	17 (31.5%)	21 (30.0%)	46 (26.0%)	
2	11 (20.8%)	7 (13.0%)	15 (21.4%)	33 (18.6%)	
3	17 (32.1%)	19 (35.2%)	20 (28.6%)	56 (31.6%)	
4	9 (17.0%)	3 (5.6%)	8 (11.4%)	20 (11.3%)	
5	8 (15.1%)	8 (14.8%)	6 (8.6%)	22 (12.4%)	

[1]Kruskal Wallis

Handover process

55% of staff surgeons considered 3 surgical handovers as 'too many' in terms of patient safety risk. Similarly 53% of residents felt this was excessive. Conversely significantly less MLPS considered 3 handovers excessive (p=0.001). There was concordance among participants in 64% that surgical handover should not include bedside rounds. There was a significant difference in the perceptions of respondents regarding the role of telephone communication in the process. 37% of staff felt this was the optimal mode and they also re-iterated their views in some of the comments illustrated in Table 3.

16% of residents felt that this was an optimal mode of communication (p=0.02). 82% of respondents felt that e-mail was not the optimal mode of communication and there was concordance between the three groups. 46% of respondents felt that an electronic-based tool is one of the optimal modes of communication (p=0.45). Two-thirds of respondents favored a problem-based list rather than a system-based comprehensive description of each patient. 73% felt this should be a checklist tailored to the specialty rather than a system-based checklist. 80% felt that it should be held in a designated office with access to information technology (IT) facilities. The majority of respondents

Table 4: Questions regarding the Handoff Process.

	Staff Surgeons (N=54)	MLPs (N=55)	Residents & fellows (N=70)	Total (N=179)	p value
How many surgical handoffs in a 24-hour period do you consider as too many in terms of risk to patient safety (1-5 handoffs)					0.0001[1]
<3 surgical handoffs	26 (30.2%)	7 (13.4%)	18 (25.7%)	41(23.5%)	
3 surgical handoffs	29 (54.7%)	17 (32.7%)	37 (52.9%)	83 (47.4%)	
>3 surgical handoffs	8(15.1%)	28 (53.8%)	15 (21.4%)	51 (29.2%)	
The optimal mode of communication in surgical handoff includes – Bedside rounds					0.7628[1]
Yes	18 (33.3%)	22 (40.0%)	25 (35.7%)	65 (36.3%)	
No	36 (66.7%)	33 (60.0%)	45 (64.3%)	114 (63.7%)	
Verbal (Face-to-face)					0.1799[1]
Yes	40 (74.1%)	45 (81.8%)	47 (67.1%)	132 (73.7%)	
No	14 (25.9%)	10 (18.2%)	23 (32.9%)	47 (26.3%)	
Phone					0.0202[1]
Yes	20 (37.0%)	12 (21.8%)	11 (15.7%)	43 (24.0%)	
No	34 (63.0%)	43 (78.2%)	59 (84.3%)	136 (76.0%)	
E-mail					0.4548[1]
Yes	9 (16.7%)	8 (14.5%)	16 (22.9%)	33 (18.4%)	
No	45 (83.3%)	47 (85.5%)	54 (77.1%)	146 (81.6%)	
Verbal and e-mail					0.5544[1]
Yes	27 (50.0%)	22 (40.0%)	33 (47.1%)	82 (45.8%)	
No	27 (50.0%)	33 (60.0%)	37 (52.9%)	97 (54.2%)	
Electronic-based tool					0.4523[1]
Yes	24 (44.4%)	30 (54.5%)	31 (44.3%)	85 (47.5%)	
No	30 (55.6%)	25 (45.5%)	39 (55.7%)	94 (52.5%)	
In your opinion, which of the following statements best represents what should be communicated during a surgical handoff session:					0.6796[1]
All clinical data and past history in a comprehensive	21 (38.9%)	17 (30.9%)	24 (34.3%)	62 (34.6%)	
detailed document					
Data on current issues, pending tasks and	33 (61.1%)	38 (69.1%)	46 (65.7%)	117 (65.4%)	
anticipated problems					
In what location should a surgical handoff take place					0.0007[2]
Patient's Room	4 (7.5%)	12 (21.8%)	2 (2.9%)	18 (10.1%)	
Outside the OR	0 (0.0%)	1 (1.8%)	1 (1.4%)	2 (1.1%)	
Designated office/room with IT facilities	39 (73.6%)	40 (72.7%)	63 (90.0%)	142 (79.8%)	
Other, please specify below	10 (18.9%)	2 (3.6%)	4 (5.7%)	16 (9.0%)	
In designing a surgical handoff tool, which do you think is a better checklist structure					0.5012[2]
System-based checklist (as used in the ICU)	12 (23.5%)	15 (27.3%)	13 (18.6%)	40 (22.7%)	
Specific checklist unique to individual surgical practices	35 (68.6%)	39 (70.9%)	54 (77.1%)	128 (72.7%)	
Other, please specify below	4(7.8%)	1(1.8%)	3(4.3%)	8(4.5%)	

[1]Chi-Square
[2]Fisher Exact

(>80%) felt that handover should include only residents and MLPs or residents in isolation.76% of respondents felt that a standardized process could be designed for use across the different specialties within the Department of Surgery (Appendix 1) (Table 4 & 5).

Assessing compliance and quality of handover

24% of respondents felt that an independent observer in the room is the optimal way to monitor compliance. 93% had no other recommendations regarding compliance and the selected comments were not in favor of monitoring compliance.

Discussion

Patient safety is central to good surgical practice. Variables that can impact upon this are extremely important. A global drive to reduce duty hours for doctors in training has revealed the ability of a poorly performed surgical handover to adversely impact upon patient

Table 5: Select answers to open ended questions.

Subject	Staff Surgeons (N=54)	Nurse practitioners (N=55)	Residents & fellows (N=179)
General perceptions of Surgical Handoff	"An electronic handoff tool would be useful but runs the risk of removing face-to-face handoff which is essential" "Classroom training should not be necessary to introduce a simple tool for communication" "Time and place should be designated but team members may not be able to attend if tied up elsewhere" "There are many scenarios where a phone conversation as adequate and you don't need to be face-to-face"	"The timing of the handoff is more relevant than the designated location" "While an electronic handoff tool may provide valuable guidance a checklist will not help" "A handoff tool is unnecessary as there are already too many electronic medical applications. Implementation of this will slow the system drastically. Furthermore, each specialty will require a modified version. A universal handoff tool will not be applicable to individual specialties"	"Sign off should be protected from pager interruptions and should be both verbal and written to prevent loss of valuable information" "The handoff tool would serve as a distraction and will divert the focus from the patient and their clinical scenario" "There is currently a lack of ownership on patients due to variability in work practice requirements which may be reduced by a robust handoff system"
Challenges to maintaining an optimal surgical handoff process	"Compliance among the relevant stakeholders" "Handoff tool is not regularly updated" "Maintaining people's attention and interest" "Training residents to communicate relevant information"	"Availability of all the stakeholders at a designated time" "Potential to omit relevant information" "Incomplete data entry into handoff tool" "The use of email to hand off is frequently used and is not the appropriate mode of handoff" "Lack of a designated meeting place"	"Pager interruptions" "Recipient of handoff scrubbed in the operating room" "Lack of compliance with communicated care recommendations" "Too many handoffs which translates into increased opportunity for errors" "Due to varying work schedules it can be difficult to coordinate an appropriate time to handoff" "The individual who is handing off is often eager to leave resulting in an incomplete handoff"
Additional barriers to effective Surgical handoff	"If patients are not too sick then handoff can be completed over the phone and the resident can remain in the operating room" "Excessive variation in work schedules prevent allocation of designated time slots with the relevant stakeholders" "Time constraints result in a 'hurried' handoff to compensate for late arrival at the handoff"	"High variability in the content of information communicated depending on the level of experience and the perceived knowledge of the recipient" "It needs to be standardized" "Apart from pager interruptions the recipient may bombard the person handing off with questions in a non structured way. This should be reserved for the end of the handoff"	"Lack of a standardized process" "Lack of awareness of the importance of a good handoff and the implications of a poor handoff" "Tendency for person handing off to predict what might go wrong rather than describing the patient in a standardized way" "The recipient being scrubbed in the operating room especially for weekend handoffs. As a result the most important handoff tends to be communicated over the phone"
Critical components which should be communicated during a handoff	"Anticipated problems over the next 12 hours" "Current issues, pending tasks, anticipated problems" "Current status and to-do list" "This is specialty-specific and depends on the acuity of their illness and the service workload"	"Current issues, pending tasks, anticipated problems" "What has been done? What needs to be done? What is the plan going forward?" "A summary of the patients hospital stay"	"Indication for admission, events in the last 8 hours, brief summary of hospital stay & plan of care in the next 24 hours" "Current issues, pending tasks, anticipated problems"

safety. In the current study there was often a divergence of opinion regarding key components of surgical handover among staff surgeons, MLPs and residents. The study clearly demonstrates that education and formal training is very important, an electronic handover tool should replace e-mail communications, a task-oriented checklist is preferable to a system-based approach and handover compliance is not something that should be monitored.

Standardization of the information content and process is important for effective communication during handovers [8]. This can be achieved by defining all components and providing appropriate educational opportunities to reinforce the preferred format. In the current study there was a large divergence of opinions in regard to the perceived value of education and standardization of the process using an electronic handover tool. When asked if 'there should be formal education' 62% of staff surgeons strongly agreed regarding it's' importance compared to 26% of residents. Individual comments from residents (not included) suggested a perceived increase workload relating to additional educational online modules at the beginning of each rotation. In fact, by standardising the process across the

department of surgery a single module of education would provide appropriate training for the entire 5-year residency program. 74% of respondents felt an electronic handover tool should be available to facilitate communication. However, there was a significant divergence of opinions among the different categories of respondents (staff vs. MLPs vs. Residents =78% vs. 85% vs. 63%: p< 0.01). Lessons from industry have provided valuable insights into how we can improve patient safety [9]. In the medical literature there is ongoing debate regarding the merits of standardizing communication behavior. It allows clear and concise information sharing prompting delivery of relevant and pertinent facts.

Despite 95% of respondents acknowledging that a 'well-executed surgical handover is an important component of patient care' 1 in 6 respondents did not know if there was a designated handover system within their own department. There is a paucity of literature on perceived barriers to handover. Some would argue that in designing a handover process one is implementing a strategy to surmount existing barriers. Hence strategies such as standardizing the information transferred, ensuring up-to-date information,

limiting interruptions and ensuring a structured face-to-face verbal interchange has been proposed [10]. By evaluating the perceptions of future stakeholders regarding barriers to handover we have identified that time constraints is perceived as one of the key barriers by 75% of respondents. 40% of respondents felt that there was a lack of awareness of its importance. Interestingly over half of the respondents felt that the additional clerical workload was a barrier with similar agreement among all categories of respondents (p=0.08). Additionally, there is a divergence of opinion regarding the lack of a standardized process and formalized education among respondents. While over 60% of staff surgeons consider both as major barriers 30-44% of residents perceive these as major barriers. At the inception of the study one may assume that residents may perceive the unwillingness of staff surgeons to excuse them from clinical duties as a major barrier. In fact only 1 in 5 residents and MLPs considered this a major barrier and over 50% disagreed that it was a barrier at all.

Conversely, 32% of staff surgeons felt it was a barrier which suggests unwillingness on the part of 1 in 3 staff surgeons to liberate their resident from clinical duties to perform a surgical handover. These findings have important implications for designing a future process. By raising awareness of its importance through education and selecting dedicated time slots surgical handover may be effectively carried out facilitated by an electronic handover tool.

One can see from the selected comments that opponents to a standardized process among residents and MLPs voice concerns regarding increasing workload (electronic tool requiring regular updating) while opponents among staff surgeons are more concerned about the prospect of trainees having other clinical commitments which will limit their availability for handover (Table 5). This may reflect the fact that staff surgeons are not directly affected by the increasing workload burden attached to a designated surgical handover. However, these individual comments are not evident in an overall analysis (Table 3). Kurt lewin described opposing institutional forces that exist when change occurs in an institution. Resisting forces will exist mainly from those who are affected most by the change while those unaffected by the change will not object so intensively.

Previous work at University of California, San Francisco demonstrated that compliance with duty hour restrictions requires 15 handovers per patients in a 5-day hospitalization or 3 per 24-hour period. Over 50% of staff and residents perceived this as too many in terms of patient safety. Having demonstrated elsewhere that this is the requirement educationalists and patient safety enthusiasts must define ways to minimize the risk to patient safety as surgical handovers are inevitable going forward [11].

Although optimization of available information technology can optimize surgical handover there is no substitute for face-to-face verbal communication [12]. 82% of respondents agreed that e-mail was not the optimal mode of communication in surgical handover yet this is the standard medium of communication transfer in most divisions at the time of writing. Clearly there is awareness by all that face-to-face communication (74%) is the optimum modality. 55% of MLPs feel that an electronic tool is an important component. In clinical practice verbal communication would be supported by some form of electronic copy to secure reproducibility and minimize erroneous omission of key facts. As clinicians we cannot rely on memory alone to transfer key patient information. 36% of respondents felt that bedside rounds were not suited to surgical handover. In practice this approach would not be practical or time efficient. 37% of staff surgeons feel that phone communication is adequate for a considerable portion. This may relate to the differences in perceived content of the handover between staff and residents. Staff surgeons may feel that the content of their handover could be conveyed by phone, while residents could perceive a more complex content which might not effectively be conveyed over the phone. The authors contend that encouraging selective use of telephone and face-to-face communications may nurture a culture of preferring a telephone conversation for ease of completion of the handover rather than for patient specific reasons.

Previous authors have suggested that a handover tool based on the body-system format can be an effective strategy to address issues with standardizing communication. This can reduce the variability of handover in content and structure while providing a comprehensive record of the patient [13]. In surgical units the higher patient volume encountered in a handover combined with the limited impact of surgery on specific systems may restrict the use of a system-based approach. The current study consistently highlights among all respondents that a handover structure based on current issues and pending tasks would be preferable over a system-based checklist as utilized in intensive care units. Furthermore, a standardized system based on these broad categories could be applicable to the entire Department of Surgery at the Mayo Clinic.

Our study has some important limitations. While the 48% response rate is acceptable the attitudes of those who did not respond may be different from those who did respond. Like many survey-based studies ours lacked objective data to explain the group's perceptions. Despite these limitations we feel that the findings provide meaningful perspectives which will strongly influence how we design and implement a handover strategy at our institution.

In conclusion the current study has provided invaluable information for the study group to prospectively design a process of handover encompassing the views of all stakeholders. It is evident that a module of education and training followed by establishing a process of handover with standardized structure and content will allow the authors to establish a purpose-built system to optimize surgical handover and improve patient safety. Through ongoing evaluation and feedback from the stakeholders we will continue to develop and refine this model to meet the requirements of changing work practices and patients perceptions.

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