Handover Practices in Trauma and Acute Care Surgery: A Multicenter Survey Study

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JH and PV designed and administered the survey. TP drafted the initial manuscript. All authors made substantial contributions to revising it critically for important intellectual content and all provided final approval of the version to be submitted.

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Abstract:

Introduction

The handover period has been identified as a particularly vulnerable period for communication breakdown leading to patient safety events. Clear and concise handover is especially critical in high acuity care settings such as trauma, emergency general surgery (EGS), and surgical critical care (SCC). There is no consensus for the most effective and efficient means of evaluating or performing handover in this population. We aimed to characterize the current handover practices and perceptions in trauma and acute care surgery.

Methods

A survey was sent to 2265 members of EAST via email regarding handoff practices at their institution. Respondents were queried regarding their practice setting, average census, level of trauma center, and patients (trauma, emergency general surgery and/or intensive care). Data regarding handover practices were gathered including frequency of handover, attendees, duration, timing, and formality. Finally, perceptions of handover including provider satisfaction, desire for improvement, and effectiveness were collected.

Results

Three hundred eighty surveys (17.1%) were completed. The majority (73.4%) of respondents practiced at level 1 trauma centers (58.9%) and were trauma/emergency general surgeons (86.5%). Thirty five percent of respondents reported a formalized handover and 52% utilized a standardized tool for handover. Only 18% of respondents had ever received formal training, but most (51.6%) thought this training would be helpful. Eighty one percent of all providers felt handoff was essential for patient care

and 77% felt it prevented harm. Seventy two percent thought their handoff practice needed

improvement and this was more common as the average patient census increased. The most common

suggestions for improvement were shorter and more concise handoff (41.6%), different handoff

medium (24.5%), and adding verbal communication (13.9%).

Conclusion

Trauma and emergency general surgeons perceive handover as essential for patient care and the

majority desire improvement of their current handover practices. Methods identified to improve the

handover process include standardization, simplification, and verbal interaction which allows for shared

understanding. Formal education and best practice guidelines should be developed.

Introduction

Communication errors are the root cause of 67% of medical errors.[1] Adverse events are most often attributed to multiple clinicians and accumulating factors over time rather than the result of a single individual or single event.[2] Effective communication between clinicians is essential to combat this cascade and provide safe and high-quality health care.[3]

An essential form of communication that occurs during transitions in patient care is known as patient "handoff" or "sign-out". This "handover" of patients is the interactive process of passing patient specific information from one caregiver to another for the purpose of ensuring the continuity and safety of the patient.[4] Due to work hour constraints placed on residents and shift-work type practice at academic medical centers, handover is a critical component of patient care which occurs multiple times each day. This process has been identified as a particularly vulnerable period for communication breakdown leading to adverse events which jeopardizes patient safety.[2,5–7] Despite the recognition of the importance of effective handoff and their relative ubiquity, no consensus exists for the most effective means to perform patient handover across all specialties. [8,9]

In an attempt to better characterize and understand perceptions surrounding the handover practices among practicing trauma and emergency general surgeons, we performed a survey study among members of the Eastern Association for the Surgery of Trauma (EAST). To our knowledge this is the first study specifically analyzing handover in this caregiver population. Our objective was to identify the most common handoff strategies and develop recommendations for quality improvement.

Methods

Survey Design

After receiving IRB approval from Indiana University School of Medicine, our survey was developed through literature review to correlate themes asked on similar surveys with questions added to gauge perceptions about handover practices. Additionally, we sought input from advanced practice providers, residents, students, and physicians in our group. The survey was trialed by a group of residents, physicians and APPs from our own institution as well as another trauma center in our city. The questions were refined after feedback from the beta testers. In an attempt to standardized handover, it was defined as "sign-out report given by the outgoing care team to the incoming care team (ie, "morning report")" in our survey.

Survey Administration

A survey was sent by email to 2265 active, senior, associate, and provisional members of EAST as provided by the leadership of EAST and approved by the Research and Scholarship Committee. By definition, "provisional" members are licensed trauma surgeons who are not all board-certified so residents and fellows are included. The survey was administered once in March, April, and May 2019. Data was collected including state and region of practice. Level designation of trauma center and type of patients cared for (trauma vs emergency general surgery) were determined. Data regarding current handoff practices were gathered including frequency, audience, length, timing, and formality. Finally, perceptions of handover including provider satisfaction, desire for improvement, and effectiveness were collected.

Data analysis

Descriptive analysis was completed using means (standard deviations), medians (inter-quartile ranges), and frequencies, as appropriate comparing baseline characteristics and outcomes between groups. One-way ANOVA was used to analyze normally-distributed continuous data, while non-parametric testing was used for non-normally-distributed data. Pearson's χ2 test was used to determine the relationship between categorical variables. Statistical significance was set at $p<0.05$ for all analyses. All statistical analyses were performed using STATA 13.0 (College Station, TX))

Results

Respondent Characteristics

The survey was sent to 2265 EAST members though 39 were undeliverable to the provided email address. Three hundred eighty surveys were completed for a 17.1% response rate. All 50 states were represented with the most from Texas (N=33). Eighty six percent of respondents were faculty, 6% were resident or fellows, 5% were advanced practice providers (APP), and 1% were nurses. Fifty nine percent of respondents practiced at an academic medical center, 33% at a community teaching hospital, 7% at a community non-teaching hospital, and 1% at a military hospital. The majority (73%) of respondents practiced at level 1 trauma centers and were trauma/acute care surgeons (87%). The most common average patient census was 21-30 patients (26%) and 75.9% reported an average census over 20 patients (Table 1).

Handoff Practices

Two hundred and sixty respondents reported twice daily handover (68%). One hundred twenty-nine of these had twice daily formal handover and 131 had one formal and one informal handover daily. Seventy nine percent of respondents reported daily handover including weekends. Handover most commonly lasted 15-30 mins (39%) and occurred most commonly between 7-8 am, (50%). Most institutions (76%) had a separate handover at the end of the day to night team, particularly at academic centers (86%). The most commonly reviewed topics included: new admits (91.1%), planned operations (77%), and overnight events (75%). Resident teaching (57% vs 29% $p<0.001$) and general team announcements (35% vs 25% $p=0.04$) were more common in academic than nonacademic centers. Thirty five percent of respondents reported a formalized handoff and 52% reported utilizing a standardized tool for handoff. Only 18% of respondents had ever received formal training but 41% of those who didn't thought this training would be helpful (Table 2).

Handoff Perception

The majority of practitioners (76.8%) at academic and community (79.6%) centers were satisfied or very satisfied with their current handoff practices. Eighty one percent of all providers felt handoff was essential for patient care (Figure 1) and 77% felt it prevented patient harm. Seventy two percent thought that their handoff practice needed improvement (Figure 2). When asked for a method to improve handover, the most common suggestions were shorter and more concise handoff (41.6%), different handoff medium (24.5%), and verbal communication (13.9%) (Table 3).

Discussion

Effective handoff practices are critical for patient safety and reducing adverse events but there is no single accepted standard practice applicable to all settings.[5] In high acuity care settings such as trauma, acute care surgery, and surgical critical care the process of providing effective handoff becomes even more error prone as patient complexity increases. [3] In our study we found the majority of respondents (81%) felt handoff was essential for patient care but 72% desired improvement. Based on these results we believe national trauma organizations should develop best practices guidelines for handover in acute care surgery.

In a systematic review of interventions to improve patient handover, Pucher *et al* found that the two main categories for improving handoff were 1) standardization with checklists and 2) formalization of handover procedures.[10] These results were similar to the guidelines placed forth by the Joint Commission in 2012 who recommended handovers be standardized to include critical content and hardwired into the hospital system. Additionally, they expressed that there should be an opportunity to ask questions during handover and educational opportunities to improve handover should be available.[11] Due to the complexity and diversity of healthcare, a single standard protocol for handover is not applicable to all aspects of healthcare despite the aforementioned guidelines. This is especially true in the trauma and emergency general surgery where handover is especially diverse and occurs in many different settings each day.[12]

Gawande et al. studied 45 surgeons regarding 145 adverse events and found that 43% (n=62) of errors were due to breakdown in communication and 66% (n=41) of those were specifically related to poor handoff.[2] This study illustrates the critical role handover plays in patient safety and drives the question of how to improve this process. Based on our study the most common suggestion for improvement (41.6%) was to make handoff shorter and more concise. There needs to be a balance between concise

and efficient communication with passing along information imperative to patient care. Handover does not have to be complex and simple tools have been developed which improve provider perception of handoff and patient safety.[4]

Communication breakdown remains a leading cause of medical malpractice. Greenberg et al reviewed 444 surgical malpractice claims and identified 66 cases that were attributed to communication breakdown. Of those, 43% were attributed to errors in patient handoff. After thorough investigation, they determined one of the keys to reducing this breakdown was standardization.[5] In our study 41.7% of those surveyed did not have a standardized tool for handoff. Prospective studies have showed the benefits of employing a sign-out tool which combine downloaded patient data from the hospital system and resident entered patient details.[10,13]

Another possible method to standardize and improve handoff is through formalization. Stahl et al. studied handoff in the intensive care unit and showed that formalization of handoff can reduce breakdowns in communication and mitigate the risk of lost information.[1] Our study found that only 34.6% of providers utilized a formalized handoff. Formalized morning handoff is the practice at our institutions, and we have found this to be an effective means of communication to multiple parties. Practically it has also been found to be beneficial as it serves as a means of resident and student education.

Effective verbal communication is important to ensure proper transmission of information and is critical in the handoff process in which a shared understanding is necessary.[3,14] In our study 14% of respondents suggested adding verbal communication to improve handoff. This is also supported by Kilpatrick et al. which showed that replacement of a telephone call for reporting critical laboratory values in an emergency room with electronic results reporting system alone resulted in 45% of emergency laboratory results going unchecked.[13]

Our study illustrated a lack of formal education for handoff in which only 19.7% had ever received formal training on handoff and 72% of those found it beneficial. Additionally, 51.6% of those with no formal training felt it would be helpful. It has been shown that formalized handoff training improves effectiveness in medical students and this has been suggested as critical education for residents. [8,14] More effort should be applied to teaching these imperative communication skills in residency.

Limitations

Our study was not without limitations. Inherent to our methods, our study suffered from survey bias in which the results reflected only the opinion of those motivated to complete the study. It is possible that a large proportion of those frustrated with their current handover practices responded, which would not necessarily be the consensus among all acute care surgeons. Our data may not be a true reflection of the entire membership of EAST or trauma and acute care surgeons at large, and only of those who feel strongly about handover. Instructions were included were included in each email to complete the survey only once per email address but our survey tool was not equipped to block respondents from taking the survey more than once. It is possible that individuals took the survey more than once. Additionally, our evaluation had a low response rate of 17.1%. Finally, our study was not prospective which inhibited us from evaluating the most effective means of performing handoff. Our conclusions were extrapolated from literature review, and respondents' opinions. Future prospective studies to determine most effective means of handoff are much needed in this field.

Conclusions

Handoff represents a vulnerable period for patient safety errors and the importance of an effective sign-out process should be a principal concern for the trauma and acute care surgeon. Our study identified that handoff is perceived as essential to patient care and a majority of trauma and acute care surgeons desire to improve their current handoff practices. Methods identified to improve the handoff process include standardization, simplification, and verbal interaction which allows for shared understanding. Formal education and best practice guidelines should be developed.

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Table 1: Respondent Demographics

	ACADEMIC	COMMUNITY TEACHING	COMMUNITY NON-TEACHING	MILITARY/GOVT	OTHER	TOTAL
N (%)	224 (58.9)	125 (32.9)	28 (7.4)	2 (0.5)	1 (0.3)	380 (100.0)
FIELD, N (%)						
GEN SURG, N (%)	11 (4.9)	12 (9.6)	7 (25.0)	1 (50.0)	0 (0.0)	31 (8.2)
TRAUMA/EGS, N (%)	197 (87.9)	111 (88.8)	19 (67.9)	1 (50.0)	1 (100.0)	329 (86.6)
ORTHO, N (%)	0 (0.0)	0 (0.0)	2 (7.1)	0 (0.0)	0 (0.0)	2 (0.5)
CRITICAL CARE, N (%)	9 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9 (2.4)
OTHER, N (%)	7 (3.1)	2 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	9 (2.4)
LEVEL, N (%)						
LEVEL 1, N (%)	216 (96.4)	63 (50.4)	0 (0.0)	1 (50.0)	0 (0.0)	280 (73.7)
LEVEL 2, N (%)	6 (2.7)	57 (45.6)	21 (75.0)	1 (50.0)	1 (100.0)	86 (22.6)
LEVEL 3, N (%)	1 (0.4)	4 (3.2)	5 (17.9)	0 (0.0)	0 (0.0)	10 (2.6)
NON=TRAUMA, N (%)	0 (0.0)	1 (0.8)	1 (3.6)	0 (0.0)	0 (0.0)	2 (0.5)
OTHER, N (%)	1 (0.4)	0 (0.0)	1 (3.6)	0 (0.0)	0 (0.0)	2 (0.5)
ROLE, N (%)						
FACULTY, N (%)	187 (83.5)	113 (90.4)	26 (92.9)	1 (50.0)	1 (100.0)	328 (86.3)
RES/FELLOW, N (%)	22 (9.8)	2 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	24 (6.3)
APP, N (%)	10 (4.5)	8 (6.4)	1 (3.6)	1 (50.0)	0 (0.0)	20 (5.3)
NURSE, N (%)	3 (1.3)	1 (0.8)	1 (3.6)	0 (0.0)	0 (0.0)	5 (1.3)
SUPPORT, N (%)	2 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.5)
OTHER, N (%)	0 (0.0)	1 (0.8)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)
AVG. CENSUS, N (%)						
0-10, N (%)	4 (1.8)	4 (3.2)	10 (35.7)	0 (0.0)	0 (0.0)	18 (4.7)
11-20, N (%)	36 (16.1)	27 (21.6)	9 (32.1)	1 (50.0)	1 (100.0)	74 (19.5)
21-30, N (%)	57 (25.4)	36 (28.8)	4 (14.3)	0 (0.0)	0 (0.0)	97 (25.5)
31-40, N (%)	45 (20.1)	30 (24.0)	5 (17.9)	0 (0.0)	0 (0.0)	80 (21.1)
41-50, N (%)	23 (10.3)	16 (12.8)	0 (0.0)	1 (50.0)	0 (0.0)	40 (10.5)
>50, N (%)	59 (26.3)	12 (9.6)	0 (0.0)	0 (0.0)	0 (0.0)	71 (18.7)

Table 2: Handoff Practices

	ACADEMIC	COMMUNITY TEACHING	COMMUNITY NON-TEACHING	MILITARY/GOVT	OTHER	TOTAL
HANDOFF_FREQ, N (%)						
DAILY FORMAL, **N (%)**	46 (20.5)	22 (17.7)	9 (32.1)	0 (0.0)	1 (100.0)	78 (20.6)
TWICE DAILY FORMAL**, N (%)**	73 (32.6)	49 (39.5)	6 (21.4)	1 (50.0)	0 (0.0)	129 (34.0)
ONE FORMAL & ONE INFORMAL, N (%)	91 (40.6)	34 (27.4)	5 (17.9)	1 (50.0)	0 (0.0)	131 (34.6)
OTHER, N (%)	14 (6.3)	19 (15.3)	8 (28.6)	0 (0.0)	0 (0.0)	41 (10.8)
HANDOFF_DAYS, N (%)						
7 DAYS, N (%)	188 (83.9)	95 (76.0)	16 (57.1)	2 (100.0)	0 (0.0)	301 (79.2)
WEEKDAYS, N (%)	17 (7.6)	16 (12.8)	4 (14.3)	0 (0.0)	0 (0.0)	37 (9.7)
OTHER, N (%)	19 (8.5)	14 (11.2)	8 (28.6)	0 (0.0)	1 (100.0)	42 (11.1)
TIMING OF HANDOFF, N (%)						
BEFORE 6 AM, N (%)	15 (6.7)	4 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	19 (5.0)
6-7AM, N (%)	57 (25.4)	35 (28.0)	1 (3.6)	1 (50.0)	0 (0.0)	94 (24.7)
7-8AM, N (%)	121 (54.0)	56 (44.8)	9 (32.1)	1 (50.0)	1 (100.0)	188 (49.5)
8-9AM, N (%)	28 (12.5)	22 (17.6)	6 (21.4)	0 (0.0)	0 (0.0)	56 (14.7)
AFTER 9AM, N (%)	3 (1.3)	8 (6.4)	12 (42.9)	0 (0.0)	0 (0.0)	23 (6.1)
HAVE YOU RECEIVED FORMAL HANDOVER TRAINING - WAS IT OR WOULD IT BE HELPFUL N (%)						
YES - HELPFUL, N (%)	34 (15.2)	15 (12.0)	3 (11.1)	2 (100.0)	0 (0.0)	54 (14.2)
YES - UNHELPFUL, N (%)	16 (7.1)	5 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	21 (5.5)
NO - HELPFUL, N (%)	89 (39.7)	56 (44.8)	12 (44.4)	0 (0.0)	0 (0.0)	157 (41.4)
NO - UNHELPFUL, N (%)	85 (37.9)	49 (39.2)	12 (44.4)	0 (0.0)	1 (100.0)	147 (38.8)

Table 3: Handoff Perception

	ACADEMIC	COMMUNITY TEACHING	COMMUNITY NON-TEACHING	MILITARY/GOVT	OTHER	TOTAL
HANDOFF PERCEPTIONS						
SATISFIED, N (%)						
VERY SATISFIED, N (%)	71 (31.7)	46 (36.8)	11 (39.3)	1 (50.0)	1 (100.0)	130 (34.2)
SOMEWHAT SATISFIED, N (%)	101 (45.1)	51 (40.8)	14 (50.0)	1 (50.0)	0 (0.0)	167 (43.9)
NEITHER SATISFIED NOR DISSATISFIED, N (%)	20 (8.9)	17 (13.6)	0 (0.0)	0 (0.0)	0 (0.0)	37 (9.7)
SOMEWHAT DISSATISFIED, N (%)	25 (11.2)	5 (4.0)	3 (10.7)	0 (0.0)	0 (0.0)	33 (8.7)
VERY DISSATISFIED, N (%)	7 (3.1)	6 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)	13 (3.4)
IMPRESSION, N (%)						
VERY HELPFUL/ESSENTIAL, N (%)	163 (72.8)	91 (72.8)	16 (57.1)	2 (100.0)	1 (100.0)	273 (71.8)
SOMEWHAT HELPFUL/NOT ESSENTIAL, N (%)	36 (16.1)	16 (12.8)	9 (32.1)	0 (0.0)	0 (0.0)	61 (16.1)
NEUTRAL, N (%)	17 (7.6)	13 (10.4)	2 (7.1)	0 (0.0)	0 (0.0)	32 (8.4)
NOT HELPFUL/NOT USEFUL, N (%)	7 (3.1)	3 (2.4)	1 (3.6)	0 (0.0)	0 (0.0)	11 (2.9)
VERY USELESS/WASTE OF TIME, N (%)	1 (0.4)	2 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	3 (0.8)
NEED TO IMPROVE HANDOFF, N (%)						
YES, N (%)	174 (77.7)	83 (66.4)	17 (60.7)	1 (50.0)	0 (0.0)	275 (72.4)
NO, N (%)	27 (12.1)	19 (15.2)	9 (32.1)	0 (0.0)	1 (100.0)	56 (14.7)
UNSURE, N (%)	23 (10.3)	23 (18.4)	2 (7.1)	1 (50.0)	0 (0.0)	49 (12.9)
IMPROVEMENTS	***	***	***	***	***	***
LONGER, MORE INFORMATION, N (%)	23 (10.3)	10 (8.0)	3 (10.7)	0 (0.0)	0 (0.0)	36 (9.5)
SHORTER, MORE CONCISE HAND-OFF, N (%)	100 (44.6)	49 (39.2)	8 (28.6)	0 (0.0)	1 (100.0)	158 (41.6)
DIFFERENT HAND-OFF MEDIUM, N (%)	53 (23.7)	32 (25.6)	8 (28.6)	0 (0.0)	0 (0.0)	93 (24.5)
VERBAL COMMUNICATION, N (%)	31 (13.8)	21 (16.8)	1 (3.6)	0 (0.0)	0 (0.0)	53 (13.9)
REVIEW IMAGING, N (%)	28 (12.5)	27 (21.6)	5 (17.9)	0 (0.0)	0 (0.0)	60 (15.8)
OTHER, N (%)	43 (19.2)	19 (15.2)	6 (21.4)	0 (0.0)	0 (0.0)	68 (17.9)
HANDOVER PREVENTS HARM, N (%)						
YES, N (%)	165 (73.7)	103 (82.4)	23 (82.1)	2 (100.0)	0 (0.0)	293 (77.1)
NO, N (%)	35 (15.6)	11 (8.8)	2 (7.1)	0 (0.0)	1 (100.0)	49 (12.9)

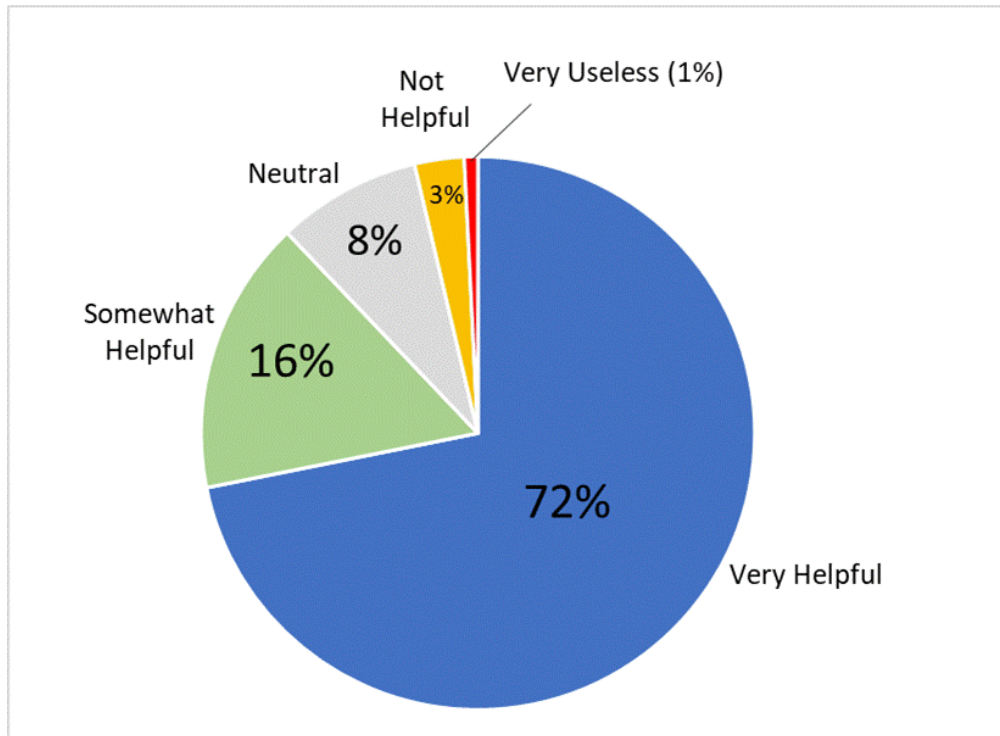| UNSURE, N (%)	24 (10.7)	11 (8.8)	3 (10.7)	0 (0.0)	0 (0.0)	38 (10.0)

Figure 1: Provider Perception of Handover

Figure 2: Does Handover Need to Improve?