

# Integration of a Formalized Handoff System Into the Surgical Curriculum

## Resident Perspectives and Early Results

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**Hypothesis:** The Situation, Background, Assessment, and Recommendation model (SBAR) provides an excellent framework for communication in daily resident handoffs.

**Objective:** To evaluate implementation of SBAR into the surgical curriculum.

**Design:** A curriculum using video and role-play scenarios to augment a didactic lecture on SBAR was implemented for general surgery residents. Resident assessment was achieved via an anonymous survey administered after training. Outcome was evaluated by assessing sentinel events and resident order entry 30 days before and after training. Surgical subspecialty resident order entries were used as controls. Duplicated, cancelled, and wrong patient orders were attributed to failed communication.

**Setting:** Academic department of surgery.

**Participants:** Forty-five general surgery residents at our institution.

**Results:** Survey response rate was 100%. Poor communication was identified as the leading cause of handoff failure, with nurse-to-resident handoffs considered the most problematic. Overall, the curriculum was well received. Outcomes analysis demonstrated no difference in sentinel events. A 2.3% decrease in pretraining and posttraining order entry errors (14.5% vs 12.2%;  $P=.003$ ) was demonstrated. No difference was demonstrated in controls who did not undergo SBAR training (12.9% vs 13.6%;  $P=.47$ ).

**Conclusions:** Most of the residents indicate that the SBAR curriculum addressed frequently encountered communication issues and taught clinically beneficial communication skills. The identified specific communication deficiencies will direct future curriculum goals. The SBAR model is an effective and valuable tool to standardize communication. Early outcomes analysis demonstrates a decrease in order entry errors after training. Sentinel events are infrequent and will require long-term evaluation.

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**A** HANDOFF IS DEFINED AS THE transfer of patient responsibility or information from one health care provider to another for the purpose of ensuring continuity and safety of patient care.<sup>1</sup> However, the hazards associated with transfer of information

### See Invited Critique at end of article

between multiple health care providers are well recognized.<sup>1-5</sup> Communication-related errors after handoffs marked by missing, incomplete, or inaccurate information are often responsible for adverse events.<sup>1-12</sup> Our institution is no exception. Root-cause analysis has identified communication errors as responsible for 75% of sentinel events at our institution.

Nationally, a great deal of attention has been placed into decreasing communica-

tion-related errors. Improved communication among health care providers has become a top priority for The Joint Commission (formerly known as the Joint Commission on Accreditation of Hospital Organizations).<sup>2</sup> As part of National Patient Safety Goal 2e, The Joint Commission included the need to “implement a standardized approach to handoff communications, including an opportunity to ask and respond to questions,” in an effort to decrease adverse hospital events.<sup>2,12</sup> As this goal recognizes, it is not sufficient to simply pass on patient information. A level-appropriate system should be established that incorporates asking questions and confirming accurate information transfer.

The Situation, Background, Assessment, and Recommendation model (SBAR) was initially developed by the US military as a means to standardize communication during situational debriefings.<sup>6</sup> The changing paradigm of health care has made

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### **SBAR Clinical Scenario 1**

Intern calls surgery attending: "Hello, Dr Gupta, I am calling you about your patient, Sean Kelly. He is in the PACU and his blood pressure is dropping. The anesthesiologist told me that I should call you."

Dr Gupta: "What is his blood pressure now?"

Intern: "About 100 over 50. I am up on the floor now, so I got his pressure from the nurse on the phone."

Dr Gupta: "How much fluid has he gotten since being in the PACU? What is his urine output?"

Intern: "I'm not sure about his IV fluids or his urine. I can go to the PACU and then call you back if you want."

Dr Gupta: "How can you call me without evaluating this patient? You need to call me after you see the patient."

Intern: "Okay, I will. Sorry."

### **SBAR Clinical Scenario 2**

Nurse calls intern: "Hello, Dr Jones, can you please come down to see Mr Hyatt—he was just brought up from the ED and said he has abdominal pain and is nauseated. He is asking for ginger ale. He wants to see a doctor."

Dr Jones: "Why is he here?"

Nurse: "I don't know, they didn't tell me. I just heard he is going to the OR soon."

Dr Jones: "I am looking at the ED notes online and I see that he had a CT scan done today that showed appendicitis. Do you know if he received antibiotics that were ordered? Do you know who from surgery saw the patient?"

Nurse: "I'm not sure, but I don't think antibiotics were ever given."

Dr Jones: "I'm really busy and this patient was never signed out to me. You need to call the admitting doctor or attending on record for the patient. I don't know anything about him."

**Figure 1.** Situation, Background, Assessment, and Recommendation (SBAR) clinical role-play scenarios. CT indicates computed tomography; ED, emergency department; IV, intravenous; OR, operating room; and PACU, postanesthesia care unit.

institution of a standardized means of communication essential because increased dependence on communication transfer among multiple health care providers is widespread. The SBAR model serves as an effective tool to standardize communication and to promote patient ownership and health care provider empowerment.<sup>3,12-15</sup> Although initially instituted for nonphysician practitioners, many hospitals are now implementing SBAR for all health care providers.<sup>12,15</sup>

Within the past several years, resident duty hour limitations introduced a new component to patient care. Although studies demonstrate an overall decrease in medical errors and enhanced quality of resident life since duty hour limitation, preservation of continuity of care remains a challenge.<sup>16-18</sup> Implementation of the 80-hour work week has increased daily resident handoffs by 40% and created a system in which shift work and dependence on nonphysician practitioners, including nurse practitioners and physician assistants, have become the norm.<sup>1</sup> Within this new paradigm of patient care, studies demonstrate an increase in preventable adverse events, longer lengths of patient stay, and an increase in laboratory study orders; all are attributed to errors in resident communication due to increased handoffs.<sup>19-21</sup> A study by Williams et al<sup>21</sup> further dissected resident communication failures and identified decreased surgeon familiarity with patients, distorted or inhibited communi-

cation, blurred boundaries of communication, and diverted surgeon attention as key factors.

To promote patient safety and continuity of care, using a system that instills a sense of patient ownership, a clear definition of roles, and empowerment is crucial.<sup>6</sup> We hypothesized that integration of a standardized resident handoff system into the surgical curriculum would minimize missed or misunderstood information, improving overall patient care. We chose SBAR because it provides an excellent framework for communication and serves as an empowerment tool by allowing an opportunity to ask questions, formulate a plan for care, and ensure information was understood. In addition, SBAR is being implemented as an institution-wide policy, ensuring communication standardization among all health care providers. The purpose of this study was to evaluate resident perceptions of handoffs, identify areas of communication deficiency, and evaluate early outcomes after formal implementation of a standardized communication model into the surgical curriculum.

## **METHODS**

A curriculum using video and role-play scenarios to augment a didactic lecture on SBAR was mandated for all interns rotating on the general surgery service and categorical general surgery residents in postgraduate years (PGY) 1 through 5 at The Mount Sinai Medical Center in January 2009, the midpoint of the academic year. The curriculum spanned 2.5 hours and occurred in a single session conducted by the program director (C.M.D.), a representative from the hospital Quality Assessment and Improvement Department, and study investigators (D.A.T., K.E.B., and B.C.). This program was piloted through the Department of Surgery in conjunction with the Quality Assessment and Improvement Department.

A total of 45 residents underwent SBAR training. Residents were shown a video displaying 3 clinical scenarios requiring transfer of information. Each scenario was first performed inappropriately, discussed, and then performed properly using the SBAR model. Scenarios were developed from frequently encountered problems within the hospital system observed by our program director, identified by the Quality Assessment and Improvement Department, and reported within the surgical literature. The first scenario modeled nurse-to-resident interaction; the second, chief resident-to-team interaction; and the third, a resident-to-resident handoff after a shift. Residents were then given 2 clinical scenarios based on the video and asked to identify and correct the erroneous transfer of information in small group discussions. **Figure 1** demonstrates 2 of the clinical role-play scenarios. Residents were expected to participate in video discussion and role-play scenarios. At the conclusion of the course, resident assessment of the practicum was achieved via an anonymous survey.

Because optimal outcome measures of communication training are unavailable, sentinel events and order entry error were chosen as incidents that are regularly attributed to communication errors. Sentinel events were identified from the morbidity and mortality surgical database and the hospital Performance Improvement Initiative. Sentinel events were defined according to The Joint Commission guidelines, namely an unexpected occurrence involving death or serious physical or psychological injury or the risk thereof and necessitating immediate investigation and response.<sup>2</sup> Order entry at our institution is electronic, and each resident must log on using a unique identifying key code. Order entries 30 days before and after train-

**Table. SBAR Survey With Results of Resident Response**

| Survey Request or Question  | Rank (No. [%] of Residents Selecting as First Choice) |
|---|---|
| Rank in order the most problematic handoffs in your experience    |   |
| Nurse to resident   | 1 (23 [51])   |
| Attending to resident   | 2 (8 [18])  |
| NP or PA to resident  | 3 (7 [16])  |
| Resident to resident  | 4 (5 [11])  |
| Chief resident to intern  | 5 (2 [4])   |
| Rank in order the most common problems encountered during handoff |   |
| Poor communication  | 1 (18 [40])   |
| Time constraints  | 2 (10 [22])   |
| Unclear designation of tasks                                      | 3 (9 [20])  |
| Distraction   | 4 (7 [16])  |
| Multiple shift changes  | 5 (1 [2])   |
| Too many team members   | 6 (0)   |

| Survey Request or Question  | Resident Response, Mean (SD) |
|---|------------------------------|
| Questions concerning the video <sup>a</sup>                               |                              |
| Do you think a problem with handoffs exists?                              | 5.8 (1.6)                    |
| Was the video helpful?  | 7.5 (2.0)                    |
| Will you be able to use the teaching points in your clinical practice?    | 8.2 (1.7)                    |
| Will your handoff technique change after watching this video?             | 7.5 (1.9)                    |
| Did this video help your overall understanding of handoffs?               | 7.7 (1.9)                    |
| Were the video scenarios appropriate?                                     | 8.5 (1.4)                    |
| Did the video present scenarios that are relevant to clinical experience? | 8.8 (1.2)                    |
| Did the video represent common problems encountered in the hospital?      | 8.6 (1.4)                    |
| Were the clinical scenarios helpful?                                      | 8.0 (1.8)                    |
| Were the scenarios appropriate?   | 8.4 (1.4)                    |
| Did the clinical scenarios augment the video teaching experience?         | 7.9 (1.9)                    |
| Were you able to recognize and correct communication errors?              | 8.7 (1.2)                    |
| Would you recommend this curriculum again?                                | 8.6 (1.6)                    |

Abbreviations: NP, nurse practitioner; PA, physician's assistant; SBAR, Situation, Background, Assessment, and Recommendation.

<sup>a</sup>Answers were given on a scale of 1 to 10, in which 1 indicates not at all; 5, somewhat; and 10, very much.

ing by participating surgical residents were identified and compared. Duplicated, cancelled, and wrong patient orders were attributed to failed communication. Surgical subspecialty residents did not undergo training, and their order entries were used as controls. Surgical subspecialties were defined as orthopedics; ear, nose, and throat; plastic; and vascular surgery. All surgical subspecialty residents rotating at The Mount Sinai Hospital during the selected study period were considered eligible controls. Surgical subspecialty residents ranged from PGY 2 through 6.

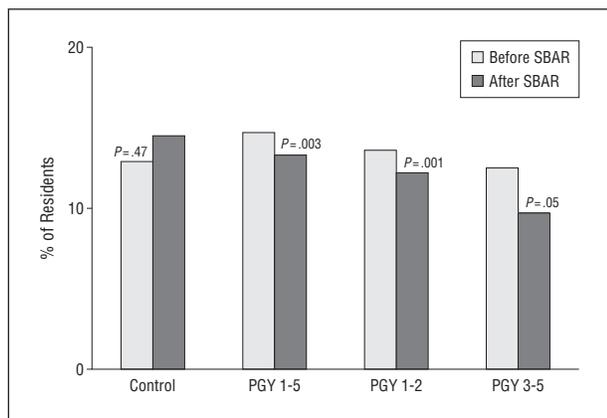
Univariate analysis was conducted by unpaired *t* test for quantitative variables and  $\chi^2$  test for categorical variables. *P* values of less than .05 were considered to confer significance. We used Prism, version 4.0, 23234e statistical software (GraphPad Software Inc, San Diego, California) for all analyses. This study was approved by The Mount Sinai School of Medicine institutional review board.

## RESULTS

Our survey response rate was 100%. The **Table** provides the administered survey questions with mean results. Poor communication was identified as the leading cause of handoff failure, with nurse-to-resident handoffs considered the most problematic. Attending-to-resident transfer of information was perceived as the second most common cause of handoff failure. Overall,

residents did not believe a problem with handoffs existed (mean score, 5.8, with 1 indicating no problem and 10, severe problem). Most of the residents indicated that the curriculum was helpful and representative of communication issues frequently encountered within the hospital. Most of the residents also indicated that they would recommend the curriculum again.

In the 30 days before and after training, a total of 13 233 electronic orders were entered by surgical residents: 6360 in the 30-day period before training and 6873 in the subsequent 30-day period. A total of 58 residents were tracked: 38 who underwent SBAR training and 20 controls. Of the 38 residents who underwent SBAR training, 25 were PGY 1 or 2 and 13 were PGY 3 through 5. Outcome assessment demonstrated a significant overall 2.3% decrease (14.5% vs 12.2%; *P* = .003) in 30-day pretraining and posttraining erroneous order entry for residents who had undergone SBAR training. Controlling for PGY level, PGY 1 and 2 residents had a significant 2.2% decrease (14.7% vs 12.5%; *P* = .001) in erroneous order entry, and residents who were PGY 3 through 5 had a significant 3.6% decrease (13.3% vs 9.7%; *P* = .05). No overall difference was demonstrated in controls who did not undergo SBAR training (12.9% vs 13.6%; *P* = .47) (**Figure 2**). One sentinel event occurred in this time



**Figure 2.** Erroneous order entry 30 days before and after Situation, Background, Assessment, and Recommendation (SBAR) training. PGY indicates postgraduate year.

frame. Analysis demonstrated no difference in pretraining and posttraining sentinel events for residents who underwent or did not undergo SBAR training.

### COMMENT

Our study demonstrated overall resident satisfaction with the implemented SBAR curriculum. Most of the residents indicated that the curriculum addressed frequently encountered communication issues and taught clinically beneficial communication skills. In a surprising finding, handoffs from attending to resident physicians were perceived as the second most problematic area of communication transfer. An explanation for this finding may involve inadequate transfer of level-appropriate information. Attending physicians may not adjust their method of information transfer based on resident comprehension, particularly for early PGY levels.<sup>22</sup> Conversely, in a more traditional hierarchical system, residents may be apprehensive about asking for clarification when information is not completely understood. The SBAR model provides an excellent framework to rectify this problem by emphasizing transfer of level-appropriate information and creating an environment that is accepting and expecting of questions.

Overall, attending-to-resident transfer was one of several communication deficiencies identified by our resident survey that will direct future curriculum goals and institute a culture change within our institution. Attending physicians will be required to reassess and standardize their method of communication. In addition, because nurse-to-resident communication was overwhelmingly selected as the most problematic area of communication transfer, comprehensive inclusion of nonphysician providers is central to curriculum development. Our department is currently part of the hospital-wide SBAR implementation for all providers, including nonsurgical and surgical subspecialty residents, nurses, nonphysician health care providers, and attending physicians. As such, by selecting SBAR, residents are taught to communicate with nurses and other nonphysician health care providers using the same communication format. Hospital-wide implementation of a standardized handoff system should improve communication between all providers.

As in our study, outcome determination continues to be the weakness of efficacy assessment of any communication model. To date, no universally accepted optimal outcome measures are available. Based on current literature, hospital sentinel events and erroneous order entry were chosen because both are frequently attributed to communication errors.<sup>10,11</sup> Early outcomes analysis demonstrated a significant 2.3% decrease in order entry errors subsequent to SBAR training. This finding persisted after controlling for PGY level. No difference was demonstrated in control surgical subspecialty residents who did not undergo SBAR training. Although not optimal, this finding suggests more effective communication by residents who underwent SBAR training. Decreased order entry error potentially confers improved patient care and decreased risk of preventable adverse outcome.<sup>10,11</sup> Although no significant difference in sentinel events was demonstrated, sentinel events are infrequent occurrences, and any conclusions concerning them will require long-term evaluation.

Although longer follow-up is necessary, short-term outcomes appear to support more effective transfer of information after standardization of communication for surgical residents at our institution. The SBAR model will continue to be an integral part of our surgical curriculum, with annual review for residents who have already completed SBAR training and implementation of training for incoming surgical residents during orientation. Future directions will include identification of additional outcome measures for increased validity and long-term sentinel event tracking. Based on early results, we support formalized integration of a standardized communication system into a surgical curriculum to decrease adverse events and ultimately improve patient care.

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## INVITED CRITIQUE

# Teaching Residents to Pass and Catch the Baton

Telem et al are to be congratulated not only for tackling an important, challenging change by implementing a formalized handoff system into a surgical curriculum but also for evaluating the outcomes in terms of effect on patient safety. Resident handoffs have increased 40% since the change in resident duty hours,<sup>1</sup> and the hazards associated with transfer of information between multiple health care providers are well recognized.<sup>2</sup> The authors evaluated SBAR as a model to provide a communication framework for resident handoffs for the 45 general surgery residents at their institution. Outcomes were evaluated by assessing sentinel events and resident order entry before and after training. Telem et al noted a significant 2.3% decrease in erroneous order entry, but there was no overall difference among controls who did not undergo SBAR training. Their findings were consistent with the literature finding that a leading cause of handoff failure is status asymmetry.<sup>3,4</sup>

There is a wealth of literature on the use of SBAR for information transfer. However, SBAR does not contain an explicit statement empowering the recipient to question, verify, and/or clarify the information from the sender. The SBAR model as it is commonly defined fails to meet the standard of closed-loop communication and will not significantly affect the common causes of communication error, which are status asymmetry and ambiguity about responsibilities.<sup>3,4</sup> Therefore, I disagree with the authors' assertion that SBAR provides an excellent framework for communication and serves as an empowerment tool. The following alternate template is provided by Weick<sup>5</sup> and is based on communication with fire chiefs in the US Forest Service:

- Here's what I think we face.
- Here's what I think we should do.
- Here's why.
- Here's what we should keep our eye on.
- Talk to me (tell me if you do not understand, cannot do it, or see something I do not).

This template specifically focuses on "sensemaking" and empowers juniors to question their leaders. Nonetheless, the study by Telem et al is a very important one that demonstrates short-term improvement in erroneous order entry. Longer follow-up will be necessary to determine whether the improvement is sustained.

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