Teamwork and Communication

On the Front Lines of Patient Safety: Implementation and Evaluation of Team Training in Iraq

Shad Deering, M.D.; Michael A. Rosen, Ph.D.; Vivian Ludi, R.N.; Michelle Munroe, C.N.M.; Amber Pocrnich, R.N.C.; Christine Laky, M.D.; Peter G. Napolitano, M.D.

Changes to the processes of delivering care to wounded soldiers in the modern military health care system have drastically improved patient outcomes in the wars in Iraq and Afghanistan when compared to other major conflicts. A fundamental change contributing to this improvement has been a focus on moving patients quickly through levels (or echelons) of care to get the wounded to a facility with the appropriate capabilities for definitive care. This often involves rapid and frequent transitions of care for critically injured patients and consequently requires high degrees of communication and coordination among team members within as well as between levels of care. As in civilian health care, effective teamwork is crucial for success.

In the decade since the Institute of Medicine’s (IOM) groundbreaking report To Err Is Human, a wide variety of teamwork-based interventions have been implemented. This article documents the implementation of the TeamSTEPPS® program throughout medical facilities in Iraq between November 2007 and December 2008—one of the most intense phases of the conflict. It also reports on the intervention’s impact on the rate of different types of patient safety events at the initial location of implementation—a combat support hospital (CSH) in Baghdad.

TeamSTEPPS, the Military Healthcare System, and the TeamSTEPPS Implementation

In the following sections, background information on the TeamSTEPPS program, the organization of the deployed Military Healthcare System (MHS), and the TeamSTEPPS implementation initiative in Iraq is provided.

TeamSTEPPS

The TeamSTEPPS program is an evidence-based teamwork system aimed at optimizing patient outcomes by improving communication and other teamwork skills among health care professionals. An intervention designed to develop a culture of safety through training teamwork skills, TeamSTEPPS was developed by the U.S. Department of Defense Patient Safety Pro-

Article-at-a-Glance

Background: Team training has been identified as a key strategy for reducing medical errors and building a culture of safety in health care. Communication and coordination skills can serve as barriers to potential errors, as in the modern deployed U.S. Military Healthcare System (MHS), which emphasizes rapid movement of critically injured patients to facilities capable of providing definitive care. A team training intervention—TeamSTEPPS®—was implemented on a large scale during one of the most intense phases of the conflict in Iraq. This evaluation of the program constituted the first undertaken in a combat theater of operations.

Implementing TeamSTEPPS in Iraq: The Baghdad combat support hospital (CSH) conducted continuous operations from a fixed facility for a 13-month deployment—between November 2007 and December 2008. The TeamSTEPPS implementation in Iraq began at this facility and spread throughout the combat theater of operations. Teamwork training was implemented in two primary training sessions, followed up with reinforcement of team behaviors on the unit by hospital leadership.

Results: A total of 153 patient safety reports were submitted during the 13 months reviewed, 94 before TeamSTEPPS implementation and 59 afterwards. After training, there were significant decreases in the rates of communication-related errors, medication and transfusion errors, and needlestick incidents. There was a significant decrease in the rate of incidents coded communication as the primary teamwork skill that could have potentially prevented the event.

Conclusions: Process improvement programs such as TeamSTEPPS implementation can be conducted under the extremely austere conditions of a CSH in a combat zone. Teamwork training decreased medical errors in the CSH while deployed in the combat theater in Iraq.
Table 1. Overview of Echelons of Care and the Units included in the TeamSTEPPS Implementation

<table>
<thead>
<tr>
<th>Level of Care</th>
<th>General Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I:</td>
<td>Battalion aide stations are embedded within the troops and serve as the first line of care for wounded soldiers. BASs consist of the unit medics and usually a general medical officer.</td>
</tr>
<tr>
<td>Level II:</td>
<td>FSTs are small, 20-member teams consisting of 3 general surgeons, 1 orthopedic surgeon, 2 nurse anesthetists, 3 nurses, medics, and other support staff. FSTs are designed to be rapidly deployable (setup time of 1 hour) and to move close to the front lines. The goal of the FST is to stabilize and evacuate patients to higher levels of care.</td>
</tr>
<tr>
<td>Level III:</td>
<td>CSHs are 200-plus-bed hospitals with operating rooms and radiology and laboratory services. The goal is to have patient stays no longer than 3 days before the patient is either released or transferred to the next level of care if further treatment is needed.</td>
</tr>
<tr>
<td>Level IV:</td>
<td>Level IV facilities, located outside the theater of operations, are where definitive treatment is provided for patients needing more than 30 days of care.</td>
</tr>
</tbody>
</table>

* Not a part of this TeamSTEPPS implementation.

The Joint Commission Journal on Quality and Patient Safety

THE MILITARY HEALTHCARE SYSTEM IN A COMBAT THEATER OF OPERATIONS

In the Iraq theater of operations during 2007–2009 there were four echelons (or levels) of care, as summarized in Table 1 (above). This organization and process is intended to move wounded soldiers as quickly as possible to facilities that have the capabilities to provide definitive care.

When the Baghdad CSH began the TeamSTEPPS implementation, there were three CSHs in the combat theater. Each CSH is a flexible collection of people, equipment, and other resources that can be divided into multiple task force (TF) sites as the needs demand and conditions permit in the combat theater. These TF sites were the workhorses of surgical support in combat zones, with wounded flowing to them directly from the point of injury on the battlefield. This often resulted in rapid escalation of patient census, followed by rapid de-escalation within a matter of hours. Each CSH typically had around 500 individuals assigned before being split into separate TF sites that would function at different locations. Local Iraqi patients who were admitted to the CSH were discharged or transferred to civilian Iraqi care, which was very limited, within 1 to 30 days when stable. U.S. soldiers were transferred to Level IV echelon care within 6 to 48 hours unless delayed by operational or environmental conditions.

IMPLEMENTING TEAMSTEPPS IN IRAQ

The Baghdad CSH conducted continuous operations from a fixed facility for a 13-month deployment—between November 2007 and December 2008. The TeamSTEPPS implementation in Iraq began at this facility and spread throughout the combat theater of operations. We now describe the implementation, which began at the Baghdad CSH and proceeded to other locations within the combat theater of operations.

Implementation at the Baghdad CSH. The patient safety officer [V.L.], along with several TeamSTEPPS Master Trainers* assigned to the Baghdad CSH developed a two-phase approach to implementing TeamSTEPPS. The basic content of the training was not altered from what is delivered in civilian facilities, but examples were used from the CSH context. In the first phase, as many staff as possible were exposed to the TeamSTEPPS concepts and tools. The second phase focused on providing more comprehensive training as scheduling allowed.

The first phase of implementation began with two TeamSTEPPS fundamentals courses attended by one to three individuals from every unit and section of the hospital for a total of 50 people. This initial cadre of trained staff served as leaders in their sections and were each responsible for implementing one TeamSTEPPS concept and tools. The second phase focused on providing more comprehensive training as scheduling allowed.

* The TeamSTEPPS Master Trainer course includes content on both teamwork and implementation and improvement.
cantly from typical delivery of TeamSTEPPS through didactic methods, which have proven effective. Section leaders also trained, modeled, and coached these behaviors in their area of the hospital. All staff—including patient administrators, laboratory personnel, for example, and not just the providers—received TeamSTEPPS training.

In the second phase of implementation, a four-hour TeamSTEPPS fundamentals course was given one to three times a week. In a three-month period, all 330 individuals (providers and general staff) at the Baghdad component of the CSH, including the Iraqi translators, received the fundamentals course. Typical deployment length for the CSH was 12–15 months. There was some turnover of physicians and nurses, depending on their specialty—for example, surgeons typically deployed for 6 months, emergency department physicians for 12 months—but in general, turnover was minimal.

Expansion Throughout the Combat Theater of Operations. The TeamSTEPPS implementation efforts at the Baghdad CSH were recognized early by leadership at the medical brigade level (the command for all medical services in the combat theater of operations), and a plan for spreading this initiative to all medical facilities in Iraq (Levels I through III) was requested soon after the implementation began. TeamSTEPPS was viewed as a potential solution to problems that led to a sentinel event* that the CSH experienced before implementation, and early successes and “good catches” helped to solidify support for the broader implementation.

The implementation strategy included two general methods: 1. Level I and Level II facilities used Web-based training; these were small units, and travel within a combat zone was difficult and dangerous. 2. Level III facilities sent a champion or change team, which typically consisted of a physician, a nurse, and a non-commissioned officer, to the CSH in Baghdad for a 2.5-day session covering TeamSTEPPS fundamentals, trainer, and culture change training. These teams then returned to their facilities and repeated the two-phase implementation method, as described previously. In some instances, instructors from the Baghdad CSH traveled to other CSH sites to assist the change team with training sessions. In total, more than 3,000 personnel were trained in TeamSTEPPS concepts across the three levels of care in Iraq.

**Methods**

**Pre- and Postimplementation Periods**

For the purposes of evaluation, the 13-month deployment period for the CSH in Baghdad was divided into a 7-month pre-implementation period and a 6-month postimplementation period (after TeamSTEPPS training was implemented and the majority of providers/staff were trained).

**Data Collection: Patient Safety Incident Reports**

During the period of this process improvement project, patient safety/incident reports were filled out for any unusual occurrence or near miss/good catch. Examples of such events included but were not limited to missed or incorrect medication doses, delay in care episodes, and missed physician orders. This standard patient safety event—the patient safety event (PSE) form—was modified by adding items that were appropriate to the environment of a deployed CSH. In addition, the form was changed to include the steps that the staff were expected to go through to debrief after a patient safety event to guide the debrief process after each event. Specifically, items were added to report communication and handoff clarity, role and responsibility clarity, maintenance of situation awareness, distribution of workload, task assistance requests and provision, as well as an assessment of errors and lessons learned (Appendix 1, available in online article; see SUPERVISOR/Team leader section for specific items). We now discuss the use of these data in the process improvement initiative and data coding for analysis.

**Incident Report Coding**

The patient safety reports were analyzed in two steps. In the first step, the event was analyzed as it happened for the purpose of immediate process improvement. In the second step, all reports for the 13-month period were retrospectively reviewed.

**Step 1.** The CSH patient safety committee, which consisted of the patient safety officer, CSH leadership, and representatives from each clinical area, held monthly meetings to review PSE reports. This committee addressed precipitating factors leading to PSEs. After TeamSTEPPS training, the PSE form included TeamSTEPPS tools, such as a Brief or Huddle (Table 2, page 354), in the analysis process for each incident. Breakdowns in specific teamwork behaviors were considered as factors contributing to the event. In addition, other features of the event, including general type of event (for example, medication and transfusion errors, needlestick exposures) were tracked.

**Step 2.** At the end of the CSH deployment, a group of three providers (two nurses and one physician) retrospectively ana-

---

*A sentinel event is an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof. Serious injury specifically includes loss of limb or function. The phrase “or the risk thereof” includes any process variation for which a recurrence would carry a significant chance of a serious adverse outcome. The Joint Commission: Sentinel Event Policy and Procedures. http://www.jointcommission.org/Sentinel_Event_Policy_and_Procedures/ (accessed Jun. 17, 2011).
lyzed all of the reports for the entire 13-month period. This group (including the CHS patient safety officer) had extensive experience with TeamSTEPPS training. The patient safety officer had firsthand knowledge of the incidents and was able to provide clarification of documentation, such as background information incompletely explained in reports, when needed. The group evaluated each incident report and determined whether there were deficiencies in any of the TeamSTEPPS competencies, grouped in four broad categories in Table 2, that contributed to the event. The group determined whether any of the specific TeamSTEPPS tools (Table 2) could have been useful in preventing the incident.

The group also evaluated incidents to determine if any of the following were factors in the occurrence: knowledge deficit, systems/facilities issues, and individual errors (that is, something that could not have been avoided by application of TeamSTEPPS tools). Distinguishing between individual and team errors was important for the coding process. For example, one needlestick injury, which occurred when a provider was performing a routine procedure on a stable patient and tried to recap a needle, could not have been avoided by applying TeamSTEPPS principles. On the other hand, a scalpel injury that occurred in the middle of a busy trauma case because the surgeon placed the blade on the scrub table without notifying the scrub technician might have been avoided by better communication or situation monitoring.

**INCIDENT REPORTS PER INPATIENT DAYS**

To ensure that the number of patient safety reports was properly represented between the pre- and postimplementation periods, they were analyzed relative to the number of inpatient days as rate of incidents per inpatient day.

**Results**

For the 7-month pre-implementation period, there were a total of 4,230 inpatient days, and for the 6-month postimplementation period there were 3,260.

**PATIENT SAFETY EVENT RATES**

As summarized in Table 3 (page 355), PSE data were analyzed in terms of changes in the frequencies of events relative to the inpatient census (that is, the number of events per inpatient days for each of the two periods). To determine if there was a significant change in event rates, chi-square tests were conducted on the pre- and postimplementation data. Rates are presented as the number of patient safety events per 1,000 inpatient days; however, the actual event rates per actual inpatient days were used in the analyses. An alpha level of 0.05 was adopted for all significance testing.

A total of 153 patient safety reports were submitted during the 13 months reviewed, 94 before TeamSTEPPS implementation and 59 afterwards. When adjusted for inpatient census, the decrease from 22.2 events pre-implementation to 18.2 per 1,000 inpatient days postimplementation was nonsignificant (Pearson’s chi-square test [1 degree of freedom] = 1.5, \( p = .22 \)).

However, as also shown in Table 3, the decreases in rates of medication and transfusion errors and needlestick injuries and exposures were significant. These two event types were chosen because they were judged to be specifically sensitive to improved communication, mutual support, and situation monitoring. The inpatient census-adjusted rate of medication and transfusion errors decreased from 7.1 events per 1,000 inpatient days pre-implementation to 1.2 events post-implementation (Pearson’s chi-square test [1 degree of freedom] = 13.9, \( p < .001 \)), an 83% decrease. Similarly, the inpatient census adjusted rates of needlestick injuries and exposures decreased from 4.0 events per 1,000 inpatient days pre-implementation to 1.2 events per 1,000 days postimplementation (Pearson’s chi-square test [1 degree of freedom] = 4.14, \( p < .05 \)), a 70% decrease.

**THE ROLE OF TEAMSTEPPS COMPETENCIES AND TOOLS IN PATIENT SAFETY EVENTS**

To investigate the potential underlying causes of the events, each incident was analyzed in relation to the four broad TeamSTEPPS competencies (Table 2). Only three incidents were coded as having two relevant competencies (all involved Communication as the primary issue and Leadership as a secondary issue). For these cases, the primary competency was the only one included in the analysis.

As detailed in Table 4 (page 355), there were no statistically significant changes in the inpatient census-adjusted rates of incidents coded as having Leadership, Situation Monitoring, or Mutual Support competencies as the primary teamwork skill that could have potentially prevented the event. However, there was a large and significant decrease—from 5.2 events per 1,000 inpatient days pre-implementation to 1.8 events postimplementation (Pearson’s chi-square test [1 degree of freedom] = 5.54, \( p < .05 \)), a 65% decrease—in the rate of incidents coded as having Communication as a likely mitigating factor.

The specific TeamSTEPPS tools judged to have been of potential value for mitigating the patient safety event are reported in Table 2. For example, cross-monitoring, rated as being applicable in 35 (23%) of the 153 reports, was the TeamSTEPPS tool most frequently judged to be of use. This was followed by...
Table 2. Overview of TeamSTEPPS Tools and Number of Cases in Which Each Tool Was Retrospectively Judged to Have Potential Value in Mitigating a Patient Safety Event*

<table>
<thead>
<tr>
<th>TeamSTEPPS Competency Areas</th>
<th>TeamSTEPPS Tools</th>
<th>Description</th>
<th>Number of Instances the Tools Could Have Helped (N = 153)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>Brief</td>
<td>Pre-performance planning involving forming the team, designating team roles and responsibilities, establishing a climate and goals, and engaging the team in short- and long-term planning</td>
<td>1 (&lt; 1%)</td>
</tr>
<tr>
<td></td>
<td>Huddle</td>
<td>In-process or ad hoc problem solving; brief meetings held to regain situational awareness, discuss critical issues and emerging events, anticipate outcomes and likely contingencies, assign resources, and express concerns</td>
<td>1 (&lt; 1%)</td>
</tr>
<tr>
<td></td>
<td>Debrief</td>
<td>Postperformance process improvement; information exchange and feedback sessions aimed at developing an accurate reconstruction of key events, analysis of why the event occurred, and what should be done differently next time</td>
<td>0</td>
</tr>
<tr>
<td>Situation Monitoring</td>
<td>Cross Monitoring</td>
<td>Process of monitoring the actions of other team members for the purpose of sharing the workload and reducing or avoiding errors</td>
<td>35 (23%)</td>
</tr>
<tr>
<td></td>
<td>IM Safe</td>
<td>Structured tool to help assess the status of team members: Illness, Medication, Stress, Alcohol and drugs, Fatigue, Eating, and Elimination</td>
<td>1 (&lt; 1%)</td>
</tr>
<tr>
<td>Mutual Support</td>
<td>Task Assistance</td>
<td>Team members actively seeking and offering support to avoid failures resulting from overload situations</td>
<td>5 (3%)</td>
</tr>
<tr>
<td></td>
<td>2-Challenge Rule</td>
<td>Rule for managing information conflict and invoked when an initial assertion is ignored; you must assertively voice your concern at least twice to ensure it is acknowledged; the member being challenged must acknowledge; if the outcome is still unacceptable either (1) take a stronger course of action, or (2) use supervisor or chain of command</td>
<td>5 (3%)</td>
</tr>
<tr>
<td></td>
<td>Collaboration</td>
<td>Process of developing a solution that meets all stakeholder goals, including the patient’s</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>CUS</td>
<td>Key words to raise attention around a specific issue: I am concerned. I am uncomfortable. This is a safety issue.</td>
<td>3 (2%)</td>
</tr>
<tr>
<td></td>
<td>DESC Script</td>
<td>Script for managing interpersonal conflict: Describe the specific situation. Express your concerns about the action. Suggest other alternatives. Consequences should be stated.</td>
<td>0</td>
</tr>
<tr>
<td>Communication</td>
<td>SBAR</td>
<td>Structured communication tool: Situation, Background, Assessment, and Recommendation</td>
<td>4 (3%)</td>
</tr>
<tr>
<td></td>
<td>Call-Out</td>
<td>Strategy used to communicate important or critical information; it informs all team members simultaneously during emergency situations</td>
<td>4 (3%)</td>
</tr>
<tr>
<td></td>
<td>Check Back</td>
<td>Pattern of closed-loop communication: sender initiates message→receiver accepts message, provides feedback confirmation→sender verifies message was received</td>
<td>3 (2%)</td>
</tr>
<tr>
<td></td>
<td>Handoff</td>
<td>Transfer of information and authority/responsibility during transitions of care</td>
<td>16 (10%)</td>
</tr>
<tr>
<td></td>
<td>I PASS the BATON</td>
<td>Structured handoff tool: Introduction, Patient, Assessment, Situation, Safety, Background, Actions, Timing, Ownership, Next</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3. Summary of Pre- and Posttraining Implementation Rates of Patient Safety Event Reports

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre-training</th>
<th></th>
<th></th>
<th>Posttraining</th>
<th></th>
<th></th>
<th>Pearson's χ²(1)</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual Rates of Events per Inpatient Days</td>
<td>Events per 1,000 Inpatient Days</td>
<td>Actual Rates of Events per Inpatient Days</td>
<td>Events per 1,000 Inpatient Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Patient Safety Reports</td>
<td>94.4:230</td>
<td>22.2:1.000</td>
<td>59.3:260</td>
<td>18.2:1.000</td>
<td>1.5</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication/Transfusion Errors</td>
<td>30.4:230</td>
<td>7.1:1.000</td>
<td>4.3:260</td>
<td>1.2:1.000</td>
<td>13.9†</td>
<td>-83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Needlestick injuries/exposures</td>
<td>17.4:230</td>
<td>4.0:1.000</td>
<td>4.3:260</td>
<td>1.2:1.000</td>
<td>4.1*</td>
<td>-70%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05  † p < .001

Table 4. Summary of Rates of Patient Safety Events Linked to TeamSTEPPS Competencies

<table>
<thead>
<tr>
<th>TeamSTEPPS Competency</th>
<th>Pre-training</th>
<th></th>
<th></th>
<th>Posttraining</th>
<th></th>
<th></th>
<th>Pearson's χ²(1)</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual Rates of Events per Inpatient Days</td>
<td>Events per 1,000 Inpatient Days</td>
<td>Actual Rates of Events per Inpatient Days</td>
<td>Events per 1,000 Inpatient Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leadership</td>
<td>27.4:230</td>
<td>6.4:1.000</td>
<td>20.3:260</td>
<td>6.1:1.000</td>
<td>.02</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>22.4:230</td>
<td>5.2:1.000</td>
<td>6.3:260</td>
<td>1.8:1.000</td>
<td>5.54*</td>
<td>-65%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Situation Monitoring</td>
<td>22.4:230</td>
<td>5.2:1.000</td>
<td>22.3:260</td>
<td>6.8:1.000</td>
<td>.75</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual Support</td>
<td>None</td>
<td></td>
<td>1.3:260</td>
<td>0.3:1.000</td>
<td>1.3</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

handoffs (10% of cases), task assistance, two-challenge rule, Situation-Background-Assessment-Recommendation (S-BAR) and call-out (approximately 3% of cases each), and check-back and CUS (2% of cases each).

Discussion
This study indicates that TeamSTEPPS was successful in improving patient safety in this deployed medical treatment environment. Although the rate of patient safety event reports did not decrease significantly, the types of errors attributable to communication issues decreased significantly—by 65%. In addition, the marked decrease in the rate of medication and transfusion errors (83%) supports the finding that TeamSTEPPS training improved communication. This is consistent with reviews of sentinel event data that suggest that communication is a leading root cause of sentinel events.

The TeamSTEPPS tools that appeared to be the most likely to help in this environment included handoffs and cross-monitoring. This is not surprising, given that in this context patients move quickly between different care facilities, a situation that can potentially magnify the risks of missing or incorrect information exchange during these transitions. Unfortunately, it was not feasible to collect information on actual changes in the quality or quantity of handoff information. Staff members in the deployed environment are in a stressful situation in which they might be especially likely to benefit from other staff members' monitoring and catching errors.

As is often the case, it is assumed that patient safety events were underreported, but it is likely that underreporting would have been comparable before and after training. If there was more awareness of PSEs after the training, then we would expect to have seen an increase in the rate of incidents reported after training. However, contrary to this expectation, there was a (nonsignificant) decrease in the rate. It is also important to note that TeamSTEPPS training was provided to all staff and not just clinical providers. This broad-based approach may have contributed to the decreases in rates of events such as medication and transfusion errors.

Many good catches were attributed to the TeamSTEPPS tools, which were of potential value to staff and leadership alike, as illustrated in the case study in Sidebar 1 (page 356).

A possible limitation of the current study involves the incident-coding process, although consensus was reached among three providers with access to firsthand knowledge of all cases. In addition, although reported events are potentially unreliable measures, we used the rate of reporting within a specific facility and did not combine or compare across facilities, so that many of the factors possibly influencing error variance, such as orga-
Case Study
Two critically wounded soldiers arrived at the staging area for transport from the Baghdad CSH to Balad Joint Base (50 miles from Baghdad, the central hub for airlift and U.S. Air Force operations in Iraq and a major transshipment point for U.S. Army supply convoys). Two ICU nurses were accompanying the soldiers on the flight to respond to any emergencies. After completing the flight-line checklist, the patients and nurses were ready to board the helicopter. However, the attending ICU physician unexpectedly arrived at the flight line and explained that she had missed her usual TeamSTEPPS handoff before the patients left the ICU.

Consequently, she wanted to call a huddle to review any last-minute issues with the nurses. During the huddle, she reminded the flight nurses that one of the patients had particularly severe respiratory injuries and that a special piece of equipment—a positive end-expiratory pressure (PEEP) valve—would be needed should he need to be resuscitated in flight. Because this valve was rarely used, it was not included in a standard flight resuscitation set. After the huddle, the crew obtained the valve before the flight left. Fifteen minutes into the 30-minute flight, the soldier suffered a respiratory arrest. Using the equipment identified in the huddle, the ICU nurses successfully resuscitated the patient. The huddle likely saved this soldier’s life, and the inclusion of PEEP valves in flight resuscitation sets became standard practice.

Comments
Although briefs, debriefs, and huddles were not frequently coded as a potential mechanism for avoiding a patient safety event, this case study illustrates their value. As preparatory and reflective processes, briefs and debriefs are often more distal to an event than other teamwork behaviors, such as communication and leadership. Consequently, in a retrospective review, it may be more difficult to judge whether a brief or debrief would have helped in a given situation as compared with other team behaviors with clear and immediate connections to the event.

CONCLUSIONS
The provision of care in an active combat theater of operations is a challenging and even unique endeavor. This study illustrates that process improvement programs such as TeamSTEPPS implementation can be conducted under the extremely austere conditions of a CSH. In response to this initial implementation, master trainers are now conducting TeamSTEPPS training with deploying CSH units before they leave for theater. In addition, TeamSTEPPS has been integrated with specific trauma training scenarios and the mandatory provider training course (the Joint Forces Combat Trauma Management Course) that all units receive before being deployed to Iraq or Afghanistan. An ongoing evaluating plan for this training is under development.

Shad Deering, M.D., is Medical Director, Andersen Simulation Center, Madigan Army Medical Center, Tacoma, Washington, and Assistant Clinical Professor, Uniformed Services University of the Health Sciences, Bethesda, Maryland. Michael A. Rosen, Ph.D., formerly Consulting Human Factors Psychologist, U.S. Department of Defense Patient Safety Program, Washington, D.C., is Assistant Professor, Department of Anesthesiology and Critical Care Medicine and Staff Member, Quality and Safety Research Group, Johns Hopkins School of Medicine, Baltimore. Vivian Ludi, M.S.N., is Nursing Section Supervisor, Department of Emergency Medicine, William Beaumont Army Medical Center, Fort Bliss, Texas. Michelle L. Munroe, C.N.M., is Deputy Commander for Nursing, Kenner Army Health Clinic, Fort Lee, Virginia. Amber Pocrnich, R.N.C., is Clinical Nurse Officer-In-Charge, Labor & Delivery, Tripler Army Medical Center, Hawaii. Christine Laky, M.D., is Staff OB/GYN Physician, Damall Army Community Hospital, Fort Hood, Texas. Peter G. Napolitano, M.D., is Director, Maternal-Fetal Medicine Fellowship, Department of Obstetrics and Gynecology, Madigan Army Medical Center. Please address correspondence to Shad Deering, Shad.deering@us.army.mil.

References
Appendix 1. Sample Patient Safety Incident Report

<table>
<thead>
<tr>
<th>DATE OF EVENT:</th>
<th>HOUR OF EVENT:</th>
<th>LOCATION OF EVENT:</th>
</tr>
</thead>
</table>

**PERSON AFFECTED BY EVENT:**
- INPATIENT
- OUTPATIENT
- VISITOR
- STAFF MEMBER

**GENERAL TYPE OF EVENT**
- Fall
- Blood Transfusion
- Occurrence
- Radiology Related
- Surgical Case
- Review
- Blood borne
- Pathogen Exposure
- Defective
- Materials
- AMA / LWOB
- Assault
- Equipment Failure
- Delay in Diagnosis,
- Transfer, Treatment
- Infection Control
- Laboratory Related
- Other:

**PERSONS INVOLVED**
- Registered Nurse
- Medication/IV Error
- Wrong Drug
- Wrong Route
- Wrong Time
- Wrong Patient
- Missed Dose
- Written incorrectly
- (abbreviations, illegible)
- Transcribed wrong
- Adverse Drug Reaction
- Policy
- Procedure
- supply/Equipment
- Plant/Facilities
- Other:

**OUTCOME/SEVERITY**
- No known injury
- Insignificant / No or minimal treatment
- Minor / Some treatment / No residual effects
- Significant / Possible residual effects
- Major / extensive residual effects
- Grave / Prognosis poor
- Death related to occurrence

**TREATMENT**
- a. WAS PROVIDER NOTIFIED? 
  - OYES
  - ONO
  - DNA
- b. DID HE/SHE SEE PATIENT? 
  - OYES
  - ONO
  - DNA
- c. PROVIDER’S NAME:
- d. Actions taken:

**GENERAL TYPE OF EVENT PERSONS INVOLVED OUTCOME/SEVERITY**

<table>
<thead>
<tr>
<th>OPERATIVE/ANESTHESIA RELATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retained/Removal of foreign body</td>
</tr>
<tr>
<td>Repeat procedure, initial was unsuccessful</td>
</tr>
<tr>
<td>Injury to organ/body part, functional/neurosensorial deficit</td>
</tr>
<tr>
<td>Wrong procedure performed, wrong body part, wrong patient</td>
</tr>
<tr>
<td>Failed regional anesthesia</td>
</tr>
<tr>
<td>Postoperative complications</td>
</tr>
<tr>
<td>Other:</td>
</tr>
</tbody>
</table>

- Unplanned extubation
- Complication of Invasive Procedure, Inpatient
- Obstetrical/Nursery Related
- Delivery unattended by a provider
- Intrapartum maternal or fetal death (>500 grams)
- APGAR <6 at 5 minutes
- Injury to infant organ/body prior to/during delivery
- Hospital Acquired Infection
- Surgical Wound |
| Central Line |
| Pneumonia |
| Peripheral Line |
| Other: |

- Blood Product Related
- Unexpected transfusion of Blood Products
- Transfusion Reaction, transfusion stopped

<table>
<thead>
<tr>
<th>AMBULATORY PATIENT - RETURN WITHIN 72 HRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major complication of outpatient care</td>
</tr>
<tr>
<td>Major complication of emergency outpatient care</td>
</tr>
</tbody>
</table>

**OTHER OCCURRENCE:**
- Unplanned Admission due to complication of outpatient care
- Missed diagnosis
- Unexpected complication of outpatient treatment
- Complication of outpatient procedure
- Other:

- Unexpected extubation
- Complication of Invasive Procedure, Inpatient
- Obstetrical/Nursery Related
- Delivery unattended by a provider
- Intrapartum maternal or fetal death (>500 grams)
- APGAR <6 at 5 minutes
- Injury to infant organ/body prior to/during delivery
- Hospital Acquired Infection
- Surgical Wound |
| Central Line |
| Pneumonia |
| Peripheral Line |
| Other: |

- Blood Product Related
- Unexpected transfusion of Blood Products
- Transfusion Reaction, transfusion stopped

**PATIENT SAFETY REPORT**

**ATTENDING PHYSICIAN AND DEPARTMENT/SERVICE**

**LOG NUMBER:**

**SAC:**

**DATE RECEIVED:**

Confidential QA Protected Document 10USC 1102(b)

Do not leave completed form in Closed Record