Patient Safety and Collaboration of the Intensive Care Unit Team

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Safe delivery of patient care has been in the spotlight since the release of the Institute of Medicine’s report, To Err Is Human, which attributed 44,000 to 88,000 preventable deaths in hospitals to medical errors in 1997. More recently, HealthGrades reported that from 2004 through 2006, an estimated 238,337 deaths were due to potentially avoidable patient safety incidents. Serious medical errors with the potential for causing harm or that actually cause harm are common in critical care areas. One estimate is that 148,000 life-threatening serious errors (both intercepted and nonintercepted) occur in critical care areas of teaching hospitals annually. Incidents due to error occur commonly during the ordering or administration of medications used for treatment, when communicating clinical information, and as a result of failure to follow protocols such as washing hands before inserting a central catheter. Causes of error include workload, fatigue, circadian dysrhythmia, overconfidence, and failure to work together as a team.

The relationship between nurse and physician team members is a prominent feature in detecting and reporting errors.

Within the past 10 to 15 years, the delivery of care in intensive care units (ICUs) has demanded more of a team effort. The team includes physicians, nurses, respiratory therapists, physical therapists, nutritionists, social workers, and other skilled professionals. Although team-oriented organizational structures and work patterns are evolving, the difficulty lies in transforming interpersonal and interprofessional relationships. Health care providers have been slow to adapt to the concepts of team and interdisciplinary collaboration. What follows is an overview of behaviors necessary for interdisciplinary collaboration in the ICU, barriers to effective communication, and the impact of communication failures. A proposal for team training and an approach for implementation are presented.

Patient Safety and ICU Interdisciplinary Collaboration

Promoting patient safety through ICU interdisciplinary collaboration requires knowledge of the constituency of the ICU team, attributes of interdisciplinary collaboration, barriers to this collaboration, and...
ICU Team Collaboration

The ICU team is a self-organizing, complex entity that expands and contracts depending on the needs of the moment. The core team may consist of the bedside nurse, respiratory therapist, and physician and may expand to include other disciplines such as social workers, dietitians, and physical therapist. The degree of collaboration and conflicts within the team fluctuate.

One view of ICU team collaboration depicts it as being rooted in ownership and the trade of commodities, the commodities being specialized knowledge, technical skills, equipment, clinical territory, and the patient. From this perspective, the key problems facing interdisciplinary teams are respecting the interface between individual and collective knowledge, and the balance between individual and collective responsibility. Recognition of others’ possession of knowledge and skills is part of the smooth collaborative functioning of a team.

Effective communication among caregivers is essential for a functioning team. The Joint Commission reports that ineffective communication is the most commonly cited cause for sentinel events. Indeed, their 2008 National Patient Safety Goals for sentinel events. Indeed, their 2008 National Patient Safety Goals included improving the effectiveness of communication among caregivers. A component of this goal is the implementation of a standardized approach to “hand off” communications. Although physicians’ reports of collaboration have not correlated with patients’ outcomes, nurses’ reports of the lack of collaboration are predictive of poor outcomes for patients. Nursing reports of lack of collaboration are associated with a higher rate of patients’ dying and being readmitted to the intensive care unit during the same hospital admission. Interestingly, physicians are more satisfied than nurses with collaboration between physicians and nurses. Although nurses think that decision making in the ICU should include input from other disciplines, physicians think that input from ICU nurses is well received and report high levels of teamwork with nurses.

Barriers to Team Collaboration

Team collaboration is an interprofessional process for communication and decision making. The shared knowledge and skills of care providers influence the care given, and each provider contributes to the final integrated management plan. Collaborative communication is the ability of 2 or more team members to send and receive information or commands clearly and accurately and to provide useful feedback. Team members share responsibility for decision making, problem solving, conflict management, and coordination. Barriers to effective communication and shared understanding include differences in status, training, language, and professional norms. Team members may lack conviction that their input is needed or desired. Behaviors that increase risk of injury to operating room patients include:

- lack of communication (failing to inform team members of a patient’s problem),
- conflict between health care providers, and
- failure to develop contingency plans in the event of potential complications.

In the ICU, these behaviors can be translated into a poor end-of-shift report, tension between physicians and nurses, and failure to anticipate potential problems such as the development of stridor after endotracheal extubation.

Facilitators for Team Collaboration

Professional status in health care influences beliefs about how easy or appropriate it is to speak up to offer ideas, ask questions, or raise concerns. Power is defined as the capability of one member to direct the behavior of another, and it can inhibit upward flow of information. Power differences in teams intensify the interpersonal risk faced by members who wish to contribute. Psychological safety is a belief that it is safe for one to take a personal risk, such as speaking up, without fear of ridicule, humiliation, or punishment. It has been reported that physicians felt significantly more psychological safety than did
nurses, who in turn reported more psychological safety than did respiratory therapists.\textsuperscript{20} Health care teams where the physician leaders are perceived as welcoming others’ input demonstrate higher psychological safety.\textsuperscript{20}

Enhancing the team collaboration of ICU team members is one means of improving patient safety. Interdependence and communications across professional group boundaries facilitates catching errors.\textsuperscript{2} Sound decision making requires team members to gather and integrate information, make logical and sound judgments, identify alternatives, consider the consequences of each alternative, and select the best one.\textsuperscript{19} Formal team training is one way of improving team collaboration. Team training improves the quality of teamwork behaviors and decreases the number of observed clinical errors.\textsuperscript{21}

**Proposal for Change**

A team is more than a group of people assembled together at the same point in time; effective teams have certain characteristics that distinguish them from other groups. Team training such as crew resource management training imparts these characteristics.

**High-Reliability Teams**

The term *high-reliability teams* has been used to describe teams that consistently and effectively work interdependently toward a shared goal in a complex environment.\textsuperscript{22} Such teams are able to make good decisions in complex and changing environments and under high levels of stress consistently and effectively over time.\textsuperscript{17} These teams are skilled in closed-loop communication, that is, the exchange of clear information, acknowledgment of receipt of that information, and confirmation of its correct understanding. Team members are aware that any one of them may possess the required expertise for any given situation and they defer to this expertise; they value all opinions.\textsuperscript{22}

High-reliability teams is a concept that has evolved from high-reliability theory.\textsuperscript{22} High-reliability theory focuses on organizations with complex environments, such as air traffic control systems and nuclear power-generation plants, where ample opportunities are available for errors to lead to catastrophic consequences. What separates these organizations from other complex industries is that their errors are prevented or managed such that the consequences are minimized. High-reliability theory proposes that such organizations promote a culture that prioritizes safety and vigilance and responsiveness to potential accidents.\textsuperscript{21}

**Crew Resource Management**

Crew resource management (CRM) training has been used for more than 20 years in the aviation industry to teach techniques in team building, error recognition, and communication that prevent or minimize the effects of human error. These techniques were developed on the basis of the cognitive and social skills noted in successful airline captains and their crews.\textsuperscript{17} Crews consisting of the copilot, engineer, and cabin personnel are able to interpret cues, make contingency plans, use available resources to build shared problem models, and expand the team to include those outside the aircraft such as the plane maintenance personnel.\textsuperscript{17} The critical care equiva-
Behaviors that are taught as countermeasures to error include briefings, monitoring, cross-checking decision making, and review and modification of plans. Participants in CRM training learn to actively participate in the decision-making process, communicate and acknowledge decisions clearly, routinely question actions and decisions, and plainly state operational decisions to other team members. They also learn to establish and convey the essentials for safety to team members, share the overall plan with the entire team, provide an atmosphere that invites open communication, and speak up regarding their own ideas, opinions, and recommendations.

Implementation of the Proposed Change

Once it has been decided to effect a change, it is necessary to communicate the desired outcomes to all persons involved, from the bedside nurse to the organization’s leaders. It is also essential to assemble the implementation group, secure organizational resources, and identify the change champions.

Communicating Desired Outcomes

Today’s organizational leaders and health care providers seek to improve patient safety. Formal teamwork training such as CRM training is one means of attaining this goal. The pertinent desired outcomes are decreased clinical error rates, improved attitudes toward teamwork among physicians and staff, and reports of interdisciplinary collaboration from nurses and physicians. Baseline measurements of these entities provide a motivating rationale for change. People to set a clear intent, agree on how they will work together, and then practice to become better observers, learners, and colleagues as they co-create the environment. Internal and external environmental appraisals must be applied by the teams and the leaders to current task strategies and to anticipated future situations. Periodic CRM retraining will be necessary for new responses and approaches to patient safety issues.

Assembling the Implementation Group

This implementation group should include the safety officer, the quality improvement coordinator, management representation from the ICUs and respiratory therapy department, and the medical directors of these units. Together, these individuals and the change leader will create the vision and develop the statement that connects the current conditions and responses. A charter is then crafted that includes measures to ensure that the participating units are progressing in the desired direction.

Securing Organizational Resources

Change teams exist within organizational contexts. The organizational context can provide the resources to support practice, experimentation, and reflection on what works. For formal team training to occur, money must be budgeted to hire a firm to provide CRM training. Experts in CRM are brought in to train the change group, nurses, respiratory therapists, and physicians in the ICUs in new skills that pertain to their work activities. Change leaders create the organizational conditions for people to set a clear intent, agree on how they will work together, and then practice to become better observers, learners, and colleagues as they co-create the environment. Internal and external environmental appraisals must be applied by the teams and the leaders to current task strategies and to anticipated future situations. Periodic CRM retraining will be necessary for new responses and approaches to patient safety issues.

Identifying Change Champions

Champions in each area must be identified by the change group to work with CRM consultants in adapting CRM tools to their specific unit according to their need. Problem solving occurs at the local level, and those that own the problem must be the ones to discover and implement the solution. Champions are individuals who informally emerge in an organization. They contribute to the innovation by actively and enthusiastically promoting its progress through the critical stages. Champion behavior is related to team performance and positively influences team members’ beliefs in the effectiveness of their efforts.

Organizational leaders and members of the change group should periodically be present in the ICUs during times when the new CRM tools are used. A determinant of the success of teamwork implementation is the sustained commitment and active involvement of executive leaders. Rewards and public recognition should be given to areas that successfully implement teamwork skills. Leaders should institute a reward system for teamwork successes.
serve as role models for teamwork themselves, and encourage staff to engage in teamwork behaviors.21

Implementing CRM Training

One example of CRM implementation can be found in a midwestern academic medical center. Administrators hired a firm that provided CRM training. Three pilots provided an 8-hour course to personnel from the operating room, ICUs, and the emergency department, including physicians, nurses, and respiratory therapists as well as the hospital’s patient safety officer, quality improvement coordinator, and chief medical officer. In addition to the course, the pilots provided consultation on development of CRM tools.

Two pilots worked with a medical-neurosurgical ICU’s clinical nurse specialist to develop a structured communication format that ensured consistent identification of patients in unstable condition to be seen at the beginning of clinical rounds. They used the format of a prebrief, a structure used in aviation to provide an overview of the upcoming mission and to identify priorities. In an aviation prebrief, critical points and anticipated outcomes are discussed and specific duties are assigned.17 This work group developed a unit-specific prebrief for conveying a global view of the ICU’s operations for the day.

Taking advantage of a process that was already in place, the unit clerk announces the start of the prebrief at 9:00 AM (when the physician team usually met to review radiographs). The group assembles around the central station where the unit clerk is stationed. The group includes the unit clerk, the unit attendant, the janitorial staff, dietitian, pharmacist, respiratory therapist, nursing students, medical students, nurses, the clinical nurse specialist, and the physicians. The prebrief lasts 5 minutes or less and is led by the attending physician, fellow, or clinical nurse specialist if the attending physician or fellow are unable to begin at 9:00. The information to be reviewed is on a laminated 4 × 6-in (10 × 15-cm) card that is posted next to the unit clerk (Table 1).

Each team member is then provided the opportunity for input, beginning with the unit clerk and ending with the attending physician. The prebrief ends with a statement by the prebrief leader about the expectation that people speak up if they see an unsafe situation. The support of the unit’s management is readily evident through the frequent presence of the nurse manager and the unit’s medical director and their stated expectations of daily attendance by all staff members unless they are directly involved in patient care at that moment.

Anticipated Outcomes

The most immediate outcome of team training is improved team behaviors. Effective team behaviors result in greater patient safety through reduction of medical errors and better management of incidents.21

Outcomes of CRM Implementation

Once CRM training is complete, the immediate anticipated outcomes are survey results that indicate improved attitudes of participants toward patient safety and teamwork and implementation of CRM tools such as checklists and briefings in the ICUs. In the preceding example, the author, the institution’s quality improvement coordinator, and patient safety officer evaluated the prebrief. The author conducted a survey 1 month after implementation and had a 63% return rate, with the following results: 89% of respondents thought that the briefing was useful and 84% thought that it helped to create a stronger team.

In addition, data were collected for 16 days to identify who spoke up, the type of input given, and whether patients were prioritized on the basis of input. On 11 of the 16 days, at least 1 team member spoke up: the unit attendant on 4 occasions, the unit clerk on 6 occasions, nurses 3 times, the respiratory therapist once, the clinical nurse specialist once, the manager once, and physicians once. Both
Table 2  Issues identified during the observation period

<table>
<thead>
<tr>
<th>Comments on general unit operations</th>
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<tr>
<td>Reminder to plug in portable computers</td>
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<td>The need to move overflow patients in the cardiac intensive care unit to</td>
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<tr>
<td>the medical/neurosurgical intensive care unit (home unit)</td>
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<tr>
<td>Notification of expected postoperative patients</td>
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<td>Information provided on where to locate footstools</td>
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<tr>
<td>Notification that the administrative team was off site and procedures on</td>
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<td>how to contact them</td>
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<tr>
<td>Notification of anticipated admissions</td>
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<tr>
<td>Reminder to use corkboards to place announcements</td>
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<tr>
<td>Notification that staff restroom was out of service</td>
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<tr>
<td>Notification of high census in all adult intensive care units and reminder</td>
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<tr>
<td>to check with house managers before accepting transfers from referring</td>
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<tr>
<td>hospitals</td>
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<tr>
<td>Reminder to physicians to write transfer orders early, rather than waiting</td>
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<tr>
<td>during clinical rounds, in an effort to facilitate flow of patients</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Patient care issues</th>
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<tbody>
<tr>
<td>Pain issues in 1 patient</td>
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<tr>
<td>Readiness to extubate</td>
</tr>
<tr>
<td>Instability of hemodynamic, respiratory status</td>
</tr>
<tr>
<td>High acuity</td>
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<tr>
<td>Patient to be transferred to another hospital</td>
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</table>

Operational and patient care issues were identified during the observation period (Table 2). All patients with care issues identified in the pre-brief were prioritized to be seen first during clinical rounds. The team members of the unit have received positive feedback for their adoption of this tool through visits from the chief medical officer, state regulators, and administrative leaders.

Over a longer period, the change leader can expect to see improved attitudes among staff toward teamwork and improved quality of teamwork behaviors. Shared situational awareness will be manifested as verbalized anticipation of future contingencies such as procedures to be used for planned computer software upgrades or future patients admitted going to other units if one unit is full. Collaborative behaviors will be observed, such as team members asking for help when they are overloaded and actively assisting other members who need assistance.

Behavior of team leaders will be congruent with the stated message of "teamwork." Team leaders will downplay power differences and display behaviors that include invitation and overt appreciation of contribution. For example, the physician will solicit input from each individual as part of the clinical rounds. Team leaders will recognize others’ possession of knowledge and skill such as asking the respiratory therapist to optimize ventilator support to attain agreed-upon parameters for a patient.

The more members feel that they work in a team characterized by interpersonal trust and respect, the more enthusiastic and devoted they are to participating in quality improvement efforts. The downstream effects can include increased satisfaction scores among staff members, increased retention of nurses, and increased satisfaction among patients and their families.

Poor communication lends itself to poor management of threats and errors at the team level. Team training improves the quality of teamwork behaviors and significantly reduces clinical errors. Interdisciplinary collaboration decreases the risk of adverse outcomes for patients.

**Conclusion**

Patient safety in the ICU and collaboration among ICU care providers are interconnected. Poor collaboration leads to increased errors and increased risk of bad outcomes for ICU patients. Formal team training using crew resource management is one way to improve collaboration and patient safety.

To learn more about patient safety, read “Competence and Certification of Registered Nurses and Safety of Patients in Intensive Care Units” by Deborah Kendall-Gallagher and Mary A. Blegen in the American Journal of Critical Care, 2009;18:106-113. Available at www.ajcconline.org.

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ICU Team Collaboration

- The core team may consist of the bedside nurse, respiratory therapist, and physician and may expand to include other disciplines such as social workers, pharmacists, dietitians, and physical therapists.
- Behaviors such as lack of communication (failing to inform team members of a patient’s problem), conflict between health care providers, and failure to develop contingency plans in the event of potential complications can be manifested in the ICU as a poor end-of-shift report, tension between physicians and nurses, and failure to anticipate potential problems (eg, development of stridor after endotracheal extubation).
- Enhancing collaboration among ICU team members is one way of improving patient safety.
- Formal team training improves the quality of teamwork behaviors and decreases the number of observed clinical errors.

Developing a High-Reliability Team

- High-reliability teams are teams that consistently and effectively work interdependently toward a shared goal in a complex environment.
- Team members exchange clear information, acknowledge receipt of that information, and confirm its correct understanding.

Crew Resource Management

Crew resource management trains participants to
- actively participate in the decision-making process,
- communicate and acknowledge decisions clearly,
- routinely question actions and decisions,
- plainly state operational decisions to others on the team,
- establish and convey the essentials for safety,
- share the overall plan with the entire team,
- provide an atmosphere that invites open communication, and
- speak up regarding their own ideas, opinions, and recommendations.

Implementing Crew Resource Management

- A structured communication format (prebrief) was developed to ensure consistent identification of patients in unstable condition to be seen at the beginning of clinical rounds.
- Led by the attending physician, fellow, or clinical nurse specialist, the prebrief lasts no more than 5 minutes and provides a global view of the ICU's operations for the day (see Table).
- At the end, each team member can provide input and then the leader concludes by reminding people to speak up if they see an unsafe situation.

Outcomes

- Improved attitudes toward patient safety and teamwork
- Use of checklists and briefings
- Increased satisfaction among staff, patients, and families
- Increased retention of nurses

Table

<table>
<thead>
<tr>
<th>Items covered in the prebrief</th>
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<tr>
<td>The number of patients to be transferred out of the unit that day (this assists the supervisor in nurse-patient assignments and the housekeepers in prioritizing their tasks)</td>
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<tr>
<td>Identification of the room of the patient in the most unstable condition (this can be from anyone’s perspective)</td>
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<tr>
<td>Other critical issues related to patients</td>
</tr>
<tr>
<td>Identification of the room(s) of patients with a score on the Glasgow Coma Scale of 5 or less (provides a prompt to notify the organ bank for evaluation as a potential donor)</td>
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<tr>
<td>Statement to participants of expectation that they will speak up if they see anything unsafe</td>
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