Improving Patient Safety Through Provider Communication Strategy Enhancements

Catherine Dingley RN, PhD, FNP; Kay Daugherty RN, PhD; Mary K. Derieg RN, DNP; Rebecca Persing, RN, DNP

Abstract

The purpose of this study was to develop, implement, and evaluate a comprehensive provider/team communication strategy, resulting in a toolkit generalizable to other settings of care. The specific aims included implementation of a structured communication tool; a standardized escalation process; daily multidisciplinary patient-centered rounds using a daily goals sheet; and team huddles. The study setting was the 477-bed medical center of the Denver Health and Hospital Authority, an integrated, urban safety-net system. Utilizing a pre-test/post-test design, baseline and post-intervention data were collected on pilot units (medical intensive care unit, acute care unit, and inpatient behavioral health units). Analysis of 495 communication events after toolkit implementation revealed decreased time to treatment, increased nurse satisfaction with communication, and higher rates of resolution of patient issues post-intervention. The resultant toolkit provides health care organizations with the means to implement teamwork and communication strategies in their own settings.

Introduction

Current research indicates that ineffective communication among health care professionals is one of the leading causes of medical errors and patient harm.[1, 2, 3] A review of reports from the Joint Commission reveals that communication failures were implicated at the root of over 70 percent of sentinel events.[4] When asked to select contributing factors to patient care errors, nurses cited communication issues with physicians as one of the two most highly contributing factors, according to the National Council of State Boards of Nursing reports.[5] In a study of 2000 health care professionals, the Institute for Safe Medication Practices (ISMP) found intimidation as a root cause of medication error; half the respondents reported feeling pressured into giving a medication, for which they had questioned the safety but felt intimidated and unable to effectively communicate their concerns.[6]

The growing body of literature on safety and error prevention reveals that ineffective or insufficient communication among team members is a significant contributing factor to adverse events. In the acute care setting, communication failures lead to increases in patient harm, length of stay, and resource use, as well as more intense caregiver dissatisfaction and more rapid turnover.[7, 8, 9, 10, 11, 12] In multisite studies of intensive care units (ICUs), poor collaborative communication among nurses and physicians, among other specific factors, contributed to as much as a 1.8-fold increase in patient risk-adjusted mortality and length of stay.[13, 14, 15]

Analysis of 421 communication events in the operating room found communication failures in approximately 30 percent of team exchanges; one-third of these jeopardized patient safety by increasing cognitive load, interrupting routine, and increasing tension in the OR setting.[2] The researchers found that communication problems were relatively straightforward and fell into four categories: (1) communications that were too late to be effective, (2) failure to communicate with all the relevant individuals on the team, (3) content that was not consistently complete and accurate, and (4) communications whose purposes were not achieved—i.e., issues were left unresolved until the point of urgency.[2]

Examining the outcomes of communication, other researchers have found associations between better nurse-physician communication and collaboration and more positive patient outcomes, i.e., lower mortality, higher satisfaction, and lower readmission rates.[16, 17, 18]

Effective communication among health care professionals is challenging due to a number of interrelated dynamics:

- Health care is complex and unpredictable, with professionals from a variety of disciplines involved in providing care at various times throughout the day, often dispersed over several locations, creating spatial gaps with limited opportunities for regular synchronous interaction.[7]
- Care providers often have their own disciplinary view of what the patient needs, with each provider prioritizing the activities in which he or she acts independently.[7]
- Health care facilities have historically had a hierarchical organizational structure, with significant power distances between physicians and other health care professionals. This frequently leads to a culture of inhibition and restraint in communication, rather than a sense of open, safe communication (psychological safety).
- Differences in education and training among professions often result in different communication styles and methods that further complicate the scenario and render communications ineffective.
- Although teamwork and effective communication are crucial for safe patient care, the educational curricula for most health care professions focus primarily on individual technical skills, neglecting teamwork and communication skills.

A cultural barrier can be found in many organizations that can be traced to the belief that quality of care and error-free performance result from professional training and effort, ignoring the inherent limitations described in human factors science.[3] In fact, human factors such as cognitive overload; the effects of stress, fatigue, distractions and interruptions; poor interpersonal communications; imperfect information processing; and flawed decisionmaking are all known to contribute to errors in health care and other complex environments, such as aviation.[3, 6] Failure to recognize and understand these issues can lead to a culture of unrealistic expectations and blame, diverting efforts away from effective team-based error management strategies.

Intervention-focused research that seeks to improve collaborative communication is lacking.[19] As a means of improving patient safety and outcomes, interventions should focus on integrating the critical attributes of collaboration, including open communication, shared responsibilities for planning and problemsolving, shared decisionmaking, and coordination.[19, 20] Additionally,

translating the theories and practices of teamwork and communication from aviation to health care is gaining support from a number of researchers citing common elements in both industries. Training efforts—such as crew resource management (CRM) and a focus on the key concepts of leadership, briefings, monitoring, cross-checking, decisionmaking, and review and modification of plans—have enhanced communication and teamwork, thus providing a mechanism for increased safety and a change in crew attitudes and behavior.[21]

Drawing on current research, the purpose of this study was to develop, implement, and evaluate a comprehensive team communication strategy, resulting in a toolkit that can be generalized to other settings of care. The specific aims included:

1. Implementation of a standardized communication tool, the SBAR (see description on next page), as a guide for communicating changes in patient status.
2. Implementation of an escalation process tool to facilitate timely communication.
3. Daily multidisciplinary patient-centered rounds using a daily goals sheet.
4. Team huddles during each shift.

Methods

Utilizing a pre-test/post-test design, this study incorporated baseline data collection and implementation of team communication interventions, followed by data collection and analysis over a 24-month period. The goal of developing a user-friendly toolkit was accomplished as feedback and findings from this study were revised and adapted.

Study Setting

Denver Health Medical Center, an urban public safety-net hospital, provided the site for this study, with specific focus on three care settings utilized for pilot testing. These settings were selected because they each provided a different type of unit organization and staff.

- Phase 1 focused on two settings: the Medical Intensive Care Unit (MICU) and the Acute Care Unit (ACU). The ACU was selected because it had a very diverse patient population, with multiple physician teams and services assigned to the unit at a given time. The MICU was selected because it was a closed unit with fewer physician teams and one primary service with more accessibility to physician consultation.
- Phase 2 focused on behavioral health units: an Adult Psychiatric Unit, an Adolescent Psychiatric Unit, and an Acute Crisis Service (psych ED). The behavioral health units were characterized by a unique patient population and unit milieu, with a more consistent physician group.

Since post-intervention data collection has been completed on the Phase 1 units, this report is focused on specific outcome measures based on Phase 1 results.

Interventions

The following communication strategies were included in the toolkit interventions and can be accessed on the Denver Health Medical Center Web site (www.safecoms.org) for further detail:

Situational briefing guide: SBAR. A standardized communication format, the SBAR, was utilized as a situational briefing guide for staff and provider communication regarding changes in patient status or needs for nonemergent events, related issues, or for events on the unit, in the lab, or within the health care team. SBAR is an acronym for:

- **Situation**: What is going on with the patient?
- **Background:** What is the clinical background or context?
- **Assessment:** What do I think the problem is?
- **Recommendation:** What do I think needs to be done for the patient?

Since SBAR provides a standardized means for communicating in patient care situations, it is effective in bridging differences in communication styles and helps to get all team members in the "same movie."[3] SBAR provides a common and predictable structure for communication, can be used in any clinical domain, and has been applied in obstetrics, rapid response teams, ambulatory care, ICUs, and other areas. SBAR also presents guidelines for organizing relevant information when preparing to contact another team member, as well as the framework for presenting the information, appropriate assessments, and recommendations.[6] SBAR has been utilized in Institute for Healthcare Improvement (IHI) collaboratives and has been endorsed by the American College of Healthcare Executives and the American Organization of Nurse Executives.

One important aspect of SBAR is its inherent recognition of nurses' and other care providers' expertise so that they are encouraged to assertively make recommendations to physicians, thus facilitating a nonhierarchical structure. In a recent study of nursing home transfers from acute care settings to skilled nursing facilities (SNF), SBAR implementation helped avert breakdowns in communication that had previously resulted in patients arriving with incomplete information and the need for important medications that were not available.[3]

In the current study, SBAR was used initially to organize and present information to communicate changes in patient status. It was also found to be useful in preparing information and for an anticipated difficult conversation with another staff member or provider. As implementation of SBAR expanded across units, a number of various uses were established. It was utilized to provide "kudos" for staff accomplishments, as a framework for reporting on patients, as a means of structuring assessments, and to structure succinct e-mail communications. A diagram of the SBAR process form and guidelines for use are presented in Table 1.

Team huddles. Provider and staff team huddles were implemented on the pilot units as a way to communicate and share information concurrently with the team early in the shift. A team huddle was defined as a quick meeting of a functional group to set the day/shift in motion via commentary with key personnel. Huddles are microsystem meetings with a specific focus, based on the function of a particular unit and team. Although both joint rounding and huddles aim to

improve team communication and patient safety and care, huddles differ in that they have a primarily operational focus. They are interdisciplinary and include operational and care personnel.

Current literature indicates daily team huddles result in fewer interruptions during the rest of the day and immediate clarification of issues.[22] Team members know there is a fixed time when they will have everyone else's attention. Daily briefings (similar to those used in huddles) have been shown to be useful for a team to quickly assess changes in clinical workload, identify relevant issues of the day, and provide a means to prioritize.[3] In a very short time, members of a care team can all be "on the same page" for the day and be ensured that relevant issues are being addressed.[3]

Guidelines for huddles include the following:

- Set a standard time each day.
- Use a consistent location.
- Stand up, don't sit down.
- Make attendance mandatory.
- Limit duration to 15 minutes.
- Begin and end on time.

Table 1.   SBAR Practice Sheet

S • B • A • R

Before you call, be prepared! Be clear, concise, focus on the problem & only report what is relevant to the current situation!

Be sure you do the following:

- Assess the patient.

- Review appropriate parts of the medical record (eg, flow sheet, MAR, physician notes/orders, labs).

- Determine the appropriate person to call.

- Have the medical record available when you call.

- Use the following form to organize your conversation.

Situation: 5-10 second "punch line" – What is happening now? What are the chief complaints or acute changes?
This is _____. I'm calling about _____
_____
_____

Background: What factors led up to this event? Pertinent history (eg, admitting diagnosis) & objective data (eg, vital signs, labs) that support how patient got here.
The patient has_____
_____
_____

Assessment: What do you see? What do you think is going on? A diagnosis is not necessary; include the severity of the problem.
I think the problem is_____
_____
_____

Recommendation: What action do you propose? State what the patient needs (get a time frame).
I request that you_____
_____
_____

- Attempt to have the same structure every day.
- Keep the agenda to limited items.

Initial pilot testing of huddles occurred within two departments: radiology and laboratory services. Huddle participants included all departmental and unit level staff members present at the time. They typically occurred at the beginning of the day or shift, lasted approximately 9 to 20 minutes, and were led by a shift supervisor or department head.

Huddles were utilized to review pertinent issues of the day (e.g., inoperable equipment or rooms), to go over the day's schedule, and to plan for possible variations/problems. Information sharing included relevant system-level messages of the day, information from recent management meetings, and departmental issues or problems. Brief discussion of specific issues, such as errors (e.g., mismarked films) was integrated with a review of the process, system issues, and reminders on how to avoid the errors. On nursing units, huddles typically were led by the nurse manager, charge nurse, or clinical nurse educator. Interviews revealed several benefits of huddles, including:

- Preparing staff for the shift/day.
- Face-to-face communication.
- Immediate response to questions.
- Streamlined resolution of issues or concerns.
- Timely response to issues or concerns.
- Efficient dissemination of information.
- Improvement in teamwork and effective communication.
- Staff involvement in decisionmaking.

In some instances, if a huddle had been skipped for a particular shift/day, staff members took notice and inquired about it. Huddles also served to enhance teamwork and the staff's sense of cohesion.

Multidisciplinary rounds using Daily Goals Sheet. Multidisciplinary rounds were implemented in the MICU with the leadership and support of the unit medical director and nurse manager. Rounds were patient-centered and could include any staff member or provider involved in the patient's care, such as a physician (e.g., attending, resident, intern, and fellow), respiratory therapist (RT), physical therapist, occupational therapist, social worker (SW), pharmacist, charge nurse, individual patient's nurse, and pastoral care provider.

Rounds were focused on open and collaborative communication, decisionmaking, information sharing, care planning, patient safety issues, cost and quality of care issues, setting daily goals of care, and communicating with patients and/or family members as they were able. Information shared during rounds was supplemented by communication at shift changes between the incoming and the outgoing care providers.

The Daily Goals Sheet was an interdisciplinary communication tool that served as a simple way of clarifying work goals among providers. It provided the means for the care team and patient

(when able) to explicitly define the goals for the day. The form was typically completed during rounds on each patient, signed by the fellow or attending physician, and given to the patient's nurse. The care team—physicians, nurses, RTs, and pharmacists—provided input and reviewed the goals for the day. The form was updated as the goals of care changed.

Current literature supports the value of multidisciplinary rounding. In a study of multidisciplinary rounding focused on daily care goals in intensive care, the results showed improved communication among providers, significant improvement in the proportion of physicians and nurses who understood the goals of care for the day (from 10 to 95 percent), and a 50 percent reduction in ICU length of stay.[23]

Prior to utilizing the patient-centered daily goals format, patient care rounds were provider-centric and lacked clarity about tasks and care plans for the day. Staff often lacked understanding of the tasks they needed to accomplish and the plan for communicating with patients, families, and other caregivers. Physicians and nurses perceived that using this format improved communication and patient care. The benefits of the goals sheet are founded on the theories of CRM (crew resource management) and are currently used in a number of ICUs participating in IHI and Veterans' Health Administration improvement efforts.[23]

Escalation Process

The intent of the original study proposal was the development and implementation of an escalation process algorithm for provider communication regarding changes in patient conditions for noncode situations. The goal of the escalation process was timely, appropriate communication between nursing staff and providers as changes in patient conditions occurred. Previously, no standardized process existed at Denver Health for this purpose, resulting in ambiguities in the decisionmaking process for each type of patient situation.

Peer-reviewed case studies revealed that the absence of a standardized and well-defined communication process had led to confusion and delay in appropriate and adequate patient care, when the need for escalating a concern existed. These issues are particularly relevant at academic medical centers similar to Denver Health, since the organizational structure includes layers of providers, such as attending physicians, fellows, senior and junior residents, and interns.

However, concurrent to the implementation phase of the project, the Department of Patient Safety and Quality developed Rapid Response Escalation Criteria, which provided nurses with patient parameters for escalation and an outline of providers to call along with a timeframe; the criteria utilized SBAR for communicating changes in a patient's condition.

The Rapid Response form served both as a guide for identifying a patient's condition that could trigger a Rapid Response call and as a communication tool for physicians to convey their assessment and plan of care. Instructions were also provided for physicians for followup with senior/attending physicians within a 4-hour timeframe. This well-documented, standardized escalation process provided role clarification and cleare patient parameters within a realistic timeframe, defining whom to call and when, in a way that could be understood by all health care team members.

Implementation

Staff and provider education and development were primary components of the communication strategy implementation. An "Implementation Toolkit" was developed to serve as a guide for the education and integration of communication and teamwork factors in clinical practice. Although specific units served as pilot areas for pre- and post-data collection, it was necessary to involve all departments and a maximum number of staff members due to the interdepartmental nature of communication. The challenge to capture a broad audience of health care team members mandated the creation of a standardized curriculum, teaching materials, and methods that could be used by multiple disciplines in a variety of forums (e.g., new employees, department orientation, student rotations, initial education, and ongoing refreshers for current employees). Health care team members participating in this intervention included nurses, unlicensed assistive personnel, physicians, respiratory therapists, occupational/physical therapists, dietitians, social workers, pharmacists, chaplains, clerical/support staff, and radiology and laboratory staff.

The nature of the acute care hospital setting presented particular challenges that required multiple teaching strategies to introduce the concepts, reinforce learning, facilitate translation of the concepts into practice, and sustain the practice changes (Table 2).

The goals of the education program included:

- Provide consistent education for all members of the health care team on the concepts of teamwork, psychological safety, and open, effective communication and its impact on patient safety.
- Integrate safe communication strategies into the organizational culture.
- Sustain the culture of teamwork, psychological safety, and open, effective communication.
- Maintain consistency and high quality in all educational efforts.
- Develop educational tools that allow for flexibility in use and application in diverse practice settings.

Table 2.   Implementation methods for provider/staff education

	Individual education	Unit/department education	Organization education
Initial expert presentation	●	●	●
Video presentation	●	●	●
Fast talks	●	●	●
Communication education notebook	●	●	
Practice scenarios (multidisciplinary)	●	●	
SBAR practice worksheets	●		
Concept poster campaign		●	●
Visual reminders (bookmarks, cards, lanyards, T-shirts)	●	●	●
PowerPoint® presentation		●	●
Champion role		●	
Web-based training	●		

The education plan was composed of two parts: one, initial education and two, followup education.

The initial (interdisciplinary) education component engaged team members and introduced the foundational concepts of human factors, effective teamwork, and communication. More than 650 health care providers (representing all health care disciplines) attended presentations by a nationally recognized patient safety expert, Michael Leonard, MD. Using "real-life" anecdotes and an evidence-based approach to factors that influence health care workers' practice, Dr. Leonard fostered a commitment from providers to work toward improving the organizational culture of patient safety.

In addition to the lecture portion of the presentation, attendees also participated in interactive group activities. They applied the SBAR format to "real-life" patient situations and coached each other in communicating patient needs. Involving an outside expert created a certain "buzz" throughout the staff and organization that facilitated interest and involvement in the topic. Feedback surveys of the initial education/presentation were overwhelmingly positive (Table 3).

Table 3.   Feedback from initial expert presentation

Question prompt	Agree[a] (%)	Strongly agree[a] (%)	Positive responses[a] (%)
This presentation increased my awareness of how human factors can affect errors and patient safety.	29.8	67	96.8
This presentation helped me understand the need for open, effective communication in the health care team.	27	70	97.0
This presentation helped me realize there may be times when others on my unit do not communicate openly.	30.4	66.4	96.8
This presentation helped increase my awareness of barriers to effective communication.	29.1	68.1	97.2
I think using SBAR would help facilitate better communication with other care providers or staff.	31.5	66.5	98.0
SBAR is easy for me to understand.	33.2	64.9	98.1
SBAR will be understood by others on my unit.	44.5	50.9	95.4
SBAR could help decrease communication problems.	35.7	61.8	97.5
SBAR could be rolled out on my unit with few problems.	48.7	42.6	91.3

a   N = 564 respondents

Source: Analysis of feedback from presentations to health care providers at Denver Health made by Michael Leonard, MD, Physician Leader for Patient Safety at Kaiser Permanente.

The followup (unit/department) education component focused on a review of the initial concepts, practice of effective communication skills, and strategies to create and sustain a culture of patient safety. In contrast to the initial "kick-off" education sessions, the followup education was a sustained effort over an extended period of time (months). Ongoing education and reinforcement of learning were achieved through formal and informal sessions on the patient care unit. A number of educational strategies were utilized including: "fast talks," worksheets, posters, visual cues and reminders, PowerPoint® presentations, unit-level champions, and a video of Dr. Leonard's initial presentation (see Table 2).

Fast talks. Feedback from direct caregivers, managers, and clinical educators indicated a need for practical teaching strategies that could fit into staff's daily work and routine. "Fast talks," a format that is concise (15 minutes), focused, and taken directly to staff members on the unit fit these criteria. Key selected topics were presented and discussed with staff as they gathered informally at convenient times during their shifts. Whenever possible, effort was made to include a multidisciplinary group.

The implementation toolkit included a fast talk notebook of teaching materials for discussion topics on concept review, practice scenarios, and practice implementation. Key concepts were presented on 1 to 2 pages that included a headline sentence to convey the essential implications for practice. Brief bulleted statements served as a guide for more detailed review. Discipline- and patient population-specific practice scenarios were also included in the notebook. A narrative described a scenario followed by appropriate SBAR format prompts. Participants worked either as a group or individually to structure the required communications. A facilitator guide included examples of potential communications.

SBAR blank communication forms/worksheets. Pads of tear-off sheets that included the SBAR, instructions for use, and a guide for preparing to contact another team member or provider were created (Table 1). Feedback from staff indicated the importance of meeting the needs of both novice and expert team members. "Novice" forms included expanded cues for section content. "Expert" forms were more streamlined. These sheets were used for practice/learning and to prepare/organize upcoming communications about actual patient situations. Tablets of the communication forms were placed on units in strategic locations (e.g., near the phone) and utilized in presentations as handouts.

Concept posters. One-line headlines capturing key concepts were developed into laminated posters and placed on units in strategic locations (e.g., nurse's stations, staff bulletin boards, and resident work stations). Clinical nurse educators, managers, and unit champions used the posters to review key concepts and reinforce previous teaching during staff meetings, huddles, and/or on an individual basis.

Visual reminders. Visual reminders—such as phone cards, bookmarks, name badge holders, T-shirts, pocket cards, and pocket notebooks—were developed to provide ongoing reminders and maintain awareness until practice changes were incorporated into unit/organization culture. These items were also used as incentives for participating in education events and to reward observed practice changes. Visual reminder "giveaways" were particularly effective because

staff members and providers were eager to obtain them, and because they reinforced previously presented concepts, providing reminders throughout the day.

PowerPoint® presentation. Developed for use in unit meetings, orientation classes, and other occasions, these presentations provided a standardized introduction and brief overview of key concepts. PowerPoint presentations were typically utilized during staff meetings and new employee orientations.

Champion role. Unit-based champions were identified by unit leadership and served as implementation "experts," reinforcing effective learning strategies and culture changes. Champions embraced the key concepts of teamwork and communication, sharing their strategies with other units. Examples included advertising educational events using SBAR format and developing an "SBAR Kudos" form to recognize coworker contributions to the unit.

Data Collection

This implementation project was evaluated using several different approaches:

- Process analysis of communication events, based on observations of communication between health care providers.
- Evaluation of patient occurrence reports: hospital data from the University Healthsystems Consortium Web-based occurrence reporting system (Patient Safety Net).
- Hospital Survey on Patient Safety Culture: staff survey responses to the Agency for Healthcare Research and Quality (AHRQ)-developed patient safety culture survey.[24]
- Evaluation of staff understanding of patient daily goals: a brief self-report survey on individual providers' understanding of the patient plan of care.
- Focus group interviews with hospital staff.

This report will focus on the process analysis of communication events, both pre- and post-implementation on Phase 1 units. Further results from other evaluation methods will be reviewed in future publications.

We defined process analysis as focused observations that utilized trained data collectors to record their observations on the communication process within the health care team. Our process analysis data collection methods were founded on the concepts of industrial engineering and observational research methodology. The data collection team—which was made up of nursing staff from various clinical, research, and administrative backgrounds—worked closely with an industrial engineer, who was trained in analyzing and improving processes. Guided by the study's co-principal investigator and industrial engineer, the team developed standard data collection guidelines, data collection tools, and coding guides.

Initial training involved observation of communication on units in teams of two or more, pilot testing the data collection forms and tools, and debriefing the data collection process. Particular attention was given to team consensus on the various components of the communication events. Observations were also reviewed to ensure inter-rater reliability.

The team defined a "communication event" as nurse-initiated communication with another health care team member (e.g., physician, respiratory therapist, pharmacist) regarding an existing or potential problem/issue related to a patient's health status or plan of care. The communication event was considered complete once an answer or resolution of the particular patient issue was received. An "event" may not necessarily end in an immediate treatment. However, it can give the nurse further direction for the plan of care (Figure 1).
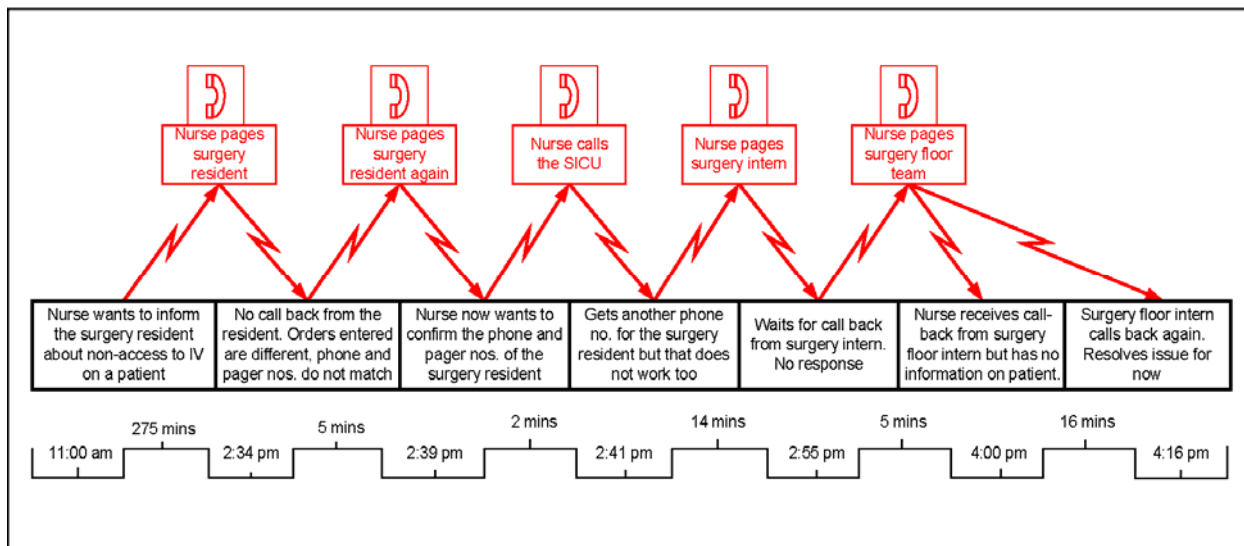
Figure 1. Graphic presentation of a process analysis communication event

Observations were made by one or two data collectors, who remained on the study unit for 1 to 4 hours at a time at different periods throughout the day and night shifts. Stationing observers on the nursing unit allowed data collectors to record communication events from multiple nurses at one geographic location. Data collectors took field notes on their observations using a standard form, asked questions of health care team members to clarify what they were observing, and asked nurses their perceptions of the communication event.

Data collected about the communication event included: who was communicating; the patient's issue or problem; method of communication (e.g., phone, page, face-to-face contact); any activities taking place during the event (e.g., searching for a phone number, traveling to a different part of the unit, finding a part of the medical record); the amount of time needed to communicate and resolve the issue; and followup questions on the nurse's perceptions about the resolution of the issue, including his/her satisfaction with the communication. Following observation of a communication event, data collectors asked nurses two questions:

- To what extent do you think this patient issue has been resolved?
- How satisfied were you with the interaction/communication?

Nurses answered on a 3- or 4-point Likert scale, depending on the question: 1 - not resolved; 2 - somewhat resolved; 3 - resolved; and 1 - not satisfied; 2 - somewhat satisfied; 3 - satisfied;

4 - very satisfied. Resolution and satisfaction scores were then recoded into positive and nonpositive responses (i.e., resolved, satisfied, or very satisfied).

The data collection team observed and analyzed 495 discrete communication events: 224 (112 pre-intervention and 112 post-intervention) on the MICU and 271 events (135 pre-intervention and 136 post-intervention) on the ACU.

Results

Data Analysis

Communication events were reviewed and coded by the data collection team *post hoc* and then entered and analyzed using SPSS® 15.0 software. Initial descriptive statistics and frequencies were analyzed for each coded category.

During any given communication event, multiple forms of communication and activities could be evident, such as an initial phone call with a followup face-to-face conversation. Thus, communication types were not mutually exclusive categories and were coded as either present or not present for each event. Most communication events on the MICU (74.6 percent) involved verbal or face-to-face communications, whereas most such events on the ACU (61.6 percent) involved numeric pages with followup/return phone calls. The most common nurse activities observed in both the MICU and ACU pre- and post-intervention were waiting for a return phone call after a page was sent or traveling to a different part of the nursing unit, either to speak with a provider or to find information (e.g., the on-call physician's phone number or a patient's bedside medical record). Of the 495 communication events observed in both the MICU and ACU, 123 (24.8 percent) involved a nurse communicating with another team member to clarify a patient's orders or plan of care.

One of the key elements observed in the process analysis was the time it took health care providers to communicate and resolve a patient issue. [Due to a violation of assumptions for parametric statistics (t-test), we used nonparametric statistics (Mann-Whitney U) to compare pre- and post-intervention times.] In the MICU, we observed a significant post-intervention decrease (P <0.01) in the mean communication/issue resolution time (Table 4). In the ACU, we observed a decrease in mean time that, while not statistically significant (P = 0.27), may have been clinically significant due to a reduction in time to treatment and nursing time spent away from other patient care activities. Given the volume of patients and daily communications that occur on the ACU, a 21 percent decrease in mean time for post-intervention communications could have positive effects.

Each communication event was further analyzed for "problematic" time that contributed to the total event time. Problematic time was defined as time that nurses spent attempting, but failing, to communicate with the correct provider (e.g., paging/calling the incorrect team) or searching for information to determine the appropriate provider or phone number (system issues). When problematic time was deducted from communication events, we reasoned, the resulting "adjusted" time was a more accurate representation of provider-to-provider communication time.

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Table 4.   Results of communications process analysis

Time for resolution of communication/issue	Pre-intervention	Post-intervention	*P-value* (1-sided)[a]
MICU			
Time for communication (min)	(N = 112)	(N = 112)	
Mean	7.19	3.69	0.007
Range	1 - 312	1 - 51	
Adjusted mean	4.52	3.37	0.01
Adjusted range	1 - 55	1 - 51	
ACU			
Time for communication (min)	(N = 135)	(N = 136)	
Mean	8.29	6.51	0.27
Range	1 - 136	1 - 61	
Adjusted mean	6.63	5.27	0.31
Adjusted range	1 - 135	1 - 60	

Resolution and satisfaction **MICU**	Pre-intervention	Post-intervention	*P*-value (2-sided)[b]
Positive nurse responses (%)	(N = 99) 67.7	(N = 111) 80.2	0.04
Satisfied/very satisfied nurse responses (%)	(N = 103) 85.5	(N = 111) 92.8	0.08
ACU	(N = 135)	(N = 136)	
Positive nurse responses (%)	66.7	75	0.13
Satisfied/very satisfied nurse responses (%)	77.1	80.1	0.53

a   t-test
b   chi-square

As shown in Table 4, the results were similar for adjusted communication time: a significant decrease ($P = 0.01$) in mean adjusted communication time for the MICU and a nonsignificant decrease ($P = 0.31$) in mean adjusted communication time for the ACU. The ranges for post-intervention times—both total and adjusted—were narrower, had smaller standard deviations, and were therefore more closely clustered around the post-intervention means, indicating a decrease in the lengthy outlier communications found in the pre-intervention data.

In addition to decreased time for communication/issue resolution, there was also an increase in the overall nurses' positive perception of communication events. Chi-square analyses of pre- and post-intervention positive resolution and satisfaction scores revealed a significant increase in positive resolution scores ($P = 0.04$) and a difference in satisfaction scores approaching significance ($P = 0.08$) in the MICU and nonsignificant increases in resolution and satisfaction scores ($P = 0.13$, $P = 0.53$, respectively) in the ACU. Positive responses to both the resolution and satisfaction questions in the post-intervention period increased.

Discussion

Our study demonstrates the value of utilizing teamwork and communication strategies among health care team members in the patient care setting. After implementation of team/communication strategies, communication time surrounding a patient concern or issue was decreased, thus bringing resolution and treatment in a timelier manner. Post-intervention, nurses (the communication initiators) perceived increased satisfaction with communication and higher rates of resolution of patient issues. Further collection and analysis of additional data measuring staff perception of the organizational safety culture, the effect of team and communication factors in patient occurrence reports, and staff and provider focus group interviews are ongoing and will provide further insight into the effectiveness of the study interventions.

The toolkit developed as a result of this study offers other health care organizations a means to implement teamwork and communication strategies in their own settings and is available on the Internet at www.safecoms.org. The intervention tools are adaptable and easily modified for use in a variety of settings. In addition, the toolkit includes an education plan and facilitator guide; fast talk book with case scenarios for nursing, medicine, lab, physical therapy, social work, dietary, and spiritual care; and templates for SBAR communication forms/worksheets, concept posters, bookmarks, pocket cards, and PowerPoint® presentations. The toolkit also includes guidelines for the data collection methods used in this project, should an organization wish to evaluate its own implementation.

Throughout the study, a number of "lessons learned" provided insight that could be useful for other organizations considering similar implementation of teamwork and communication strategies. First, it is paramount to secure administrative and clinical support on all management levels, from the executive to the unit level support. It was important for management and leaders to demonstrate that teamwork and communication were valued as important factors contributing to patient safety and staff satisfaction. Furthermore it was important that they provided the means for staff to attend presentations, encouraged further unit level education, and facilitated integration of the concepts into practice.

The degree of leadership support varied from unit to unit and clearly made a difference in the integration of the communication strategies into practice. Those areas with less leadership support for the project required more mentoring and coaching from the study team over a longer period of time. In contrast, when leaders embraced the concepts of teamwork and communication, units integrated the practices into their daily functions in a variety of ways. Engaged leaders "role-modeled" the use of the communication strategies, and their staff responded in like fashion. The degree of leadership support may be one of the important factors contributing to variations in the findings among the Phase 1 units.

We also found that staff members were acutely aware of the culture within an organization and on their unit as it related to psychological safety, reporting patient occurrences, and team communication. Once again, those leaders who were committed to teamwork and open communication set the tone for psychological safety and created an environment for staff to communicate freely and professionally without fear or inhibition. Other units required additional efforts on the part of the study team to help create and point out experiences that demonstrated a safe culture and additional mentoring for the unit leadership.

The issue of "problematic time" (i.e., the time nurses spent attempting, but failing, to communicate with the correct provider or searching for information to determine an appropriate provider or phone number) was an important system-related finding that warrants further investigation. As data collection progressed, it became apparent that "communication events" were complex and included time spent "hunting and gathering" for the correct information related to whom to call, how to best contact them, and what to do when the primary person was not available. On average, "problematic time" consisted of 10 to 40 percent of total communication time, indicating a clear need for clarification in communication procedures that are unit-specific and easily implemented. It is likely that other academic medical centers face similar challenges and that this project could provide further insights and guidance toward potential solutions. Updates on this topic will be included on the www.safecoms.org Web site as they are developed.

There are also a number of other challenges to achieving interdisciplinary education and training in an academic setting such as ours. Physician engagement is particularly challenging due simply to the nature of the academic setting, with resident rotations, various levels of providers, and the number of physician teams. Our study team developed specific educational strategies that could be presented during existing meeting times, such as noon conferences, resident orientation, and outcomes conferences. The support and engagement of the chief medical resident and chief hospitalist were instrumental in these efforts. In addition, we integrated the perspectives of other disciplines/departments by eliciting their participation in the development of discipline-specific case scenario examples for the curriculum.

Finally, as with other new practices and skills, an important consideration in the overall implementation plan is keeping the strategies and practices going. The ability to educate new staff and continue integrating communication practices presents a challenge that should be considered early in the planning stage. Since few formal education programs across disciplines include teamwork and communication strategies in their curricula, it is particularly incumbent upon health care organizations to incorporate them into staff education and training. We have integrated teamwork and communication concepts and skills into department- and unit-level orientation for new staff and nursing skills fairs for current staff, and we are working on integrating them into competency skills testing.

Conclusion

Our study suggests that strategies to enhance teamwork and communication can be successfully implemented in the acute care setting, and that they result in more efficient and effective communication. Because ineffective communication among health care team members contributes to patient harm and adverse events, interventions and implementation methods become instrumental in preventing negative patient outcomes. This project provided the opportunity to develop, implement, and evaluate an educational program and interventions using multiple measures across diverse patient care units. The resultant toolkit is available on the Internet and can be adapted for use in a variety of settings. Further efforts to evaluate the strategies using additional measures are ongoing. Recommendations for future research include implementation of the strategies in different health care settings (e.g., outpatient clinics, rural

hospitals, and nonacademic settings); integration of the strategies into simulation projects; longitudinal studies to determine the effectiveness and sustainability of the strategies over time; and utilizing specific patient-centered outcome measures and staff-related measures, such as satisfaction, recruitment and retention.

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Author Affiliations

Denver Health Medical Center, Denver, CO.

Address correspondence to: Catherine Dingley, RN, PhD, Department of Nursing Quality, Outcomes, Research, and Evidence Based Practice, Denver Health Medical Center, 777 Bannock Street MC 0260, Denver, CO 80204-4507; e-mail: Catherine.Dingley@dhha.org or CDingley@aol.com; project Web site: www.safecoms.org.

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