

Article ■

The Operating Room Charge Nurse: Coordinator and Communicator

JACQUELINE MOSS, RN, MS, YAN XIAO, PHD, SITI ZUBAIDAH, RN

Abstract To achieve the potential inherent in the use of computer applications in distributed environments, we need to understand the information needs of users. The purpose of this descriptive study was to document the communication of an operating room charge nurse to inform the design of technological communication applications for operating room coordination. A data collection tool was developed to record: 1) the purpose of the communication, 2) mode of communication, 3) the target individual, and 4) the length of time taken for each occurrence. The chosen data collection categories provided a functional structure for data collection and analysis involving communication. Study findings are discussed within the context of application design.

■ *J Am Med Inform Assoc.* 2002; 9(Nov-Dec suppl):S70–S74. DOI 10.1197/jamia.M1231.

Introduction

The primary goal of operating room coordination is to insure the prompt, safe, and effective care of surgical patients. Central to this goal is the operating room (OR) charge nurse. The charge nurse is integrally involved in insuring that staff, patients, and equipment come together seamlessly to move patients through the surgical process. While in recent years, operating room patient and staff scheduling systems have been implemented, little attention has been directed at the totality of coordination needs.¹ Therefore, essential to understanding operating room coordination is an examination of the communication of the OR charge nurse.

The Association of Operating Room Nurses (AORN) lists coordination of care for surgical patients as the first item in their outline of the responsibilities of perioperative nursing practice. AORN specifically mentions communication skills as a key component of coordination.² Sonneberg advises OR charge nurses to “communicate, communicate, communicate”³ for successful coordination. Communication is

the method by which information is transferred and is essential for all organizational interaction.⁴

In a review of 16,000 hospital deaths due to error, Wilson et al., found that communication errors were the leading cause and resulted in twice as many deaths as clinical inadequacy.⁵ Donchin et al. found that 37% of errors in a critical care unit were the result of verbal exchanges between nurses and physicians.⁶ On the other hand, facial and vocal cues provide a significant proportion of a message’s meaning and the removal of these cues, as with electronic messaging devices, decreases a message’s clarity.⁷ In addition, messaging devices such as paging systems,⁸⁻¹⁰ and telephones¹¹ can disrupt current activities. Such disruptions can cause an individual to forget to carry out an intended act, even when only ten seconds separates the intention from the intrusion.¹²

Communication provides a basis for judgements that are supported by a social network of nurses, surgeons, anesthesiologists, technicians, and auxiliary staff.¹³ The OR charge nurse then becomes a conduit for information flow, receiving, processing, and communicating this information to others for the coordination of patient care.

Investigations of catastrophic accidents, such as the Challenger disaster, indicate that these incidents are

Affiliations of the authors: University of Maryland, Baltimore, School of Nursing (JM), University of Maryland, Baltimore, School of Medicine (YX), National University Hospital, Singapore (SZ).

often the result of faulty system design. Computer applications have the capability to change system processes to decrease communication that can lead to error. To achieve the potential inherent in the use of computer applications in distributed environments, we need to understand the information needs of users.¹⁴ The purpose of this descriptive study was to document the communication of an operating room charge nurse to inform the design of a technological communication application.

Setting and Subjects

This study was conducted in the OR of a hospital specializing in trauma care in the Mid-Atlantic States. Only patients experiencing traumatic injury are admitted to this hospital, and gain access through emergency medical service helicopters or ambulances. The hospital includes six operating suites, one of which is reserved for patients' requiring immediate surgery. The patients that are admitted to the OR may be from the trauma admitting area, hospital floor, or as previous patients admitted through the outpatient department for follow-up care. The operating room unit is located within the vicinity of the trauma resuscitation unit, post anesthesia care unit and the radiology department.

Operating room staff includes 54 nurses, 4 nurse assistants, and 1 clerk supervised by the operating room charge nurse. In addition, the charge nurse communicates with surgeons, surgical fellows, anesthesia, nursing and order to facilitate patient movement in a very robust environment. The charge nurse in the OR was chosen for this study due to her role as coordinator.

The Charge Nurse

The charge nurse is responsible for the day-to-day smooth running of OR activities. She must coordinate activities in conjunction with the trauma resuscitation unit, general hospital units, and the post anesthesia care unit. Besides managing the personnel under her supervision, some of her other activities included staff education, competency testing, scheduling, and other administrative duties such as budgeting.

The charge nurse starts her shift at 6:00am and ends her shift at 7:30pm. Her day begins with receiving report from the night nurse. The report focuses on the number of cases, the scheduling of patients into the specific operating rooms, patient's readiness, staff availability, and any other pertinent information relating to the scheduling of the patients for surgery.

After receiving the report, she re-evaluates the cases and begins refining the schedule by either re-sequencing or re-scheduling them. On some occasions, she plans the listing with the attending anesthesiologist immediately upon receiving her report to determine availability of staffing and rooms. By about 7:00am, an 'informal' gathering takes place at the 'desk' and staff receive or sometimes discuss room assignments democratically. At this point the OR is ready for patients.

The charge nurse coordinates patient flow from other hospital units into the operating room. This includes ensuring that the patient is ready for surgery, surgeon is available to perform the surgery and the operating room is cleaned, and prepared with the appropriate equipment for the planned surgery, and a competent operating room staff is assigned.

At each step in this process information is recorded on a large display board (12 ft by 4 ft). The board is a visual representation of patient, staff, and equipment movement throughout the operating room suites and has evolved into a sophisticated coordination tool for clinicians and supporting personnel. Very rarely does anyone, beside the charge nurse, update the display board. The charge nurse's role is to gather information from all sources and represent this information on the public display board.

Method

Tool Design

Communication behaviors in clinical settings have been studied through observation,⁹ self-report logs,^{8,10} and ethnographic¹³ methods. The development of the data collection tool for this study was an attempt to consistently capture objective data specific to the organizational context.

Through experience and observation in the operating room, the initial categories for the data collection tool were developed. Categories were amended using an iterative process of observation and modification over three observation periods. Major tool categories could be considered generic to any communication episode, however, determining the extent of coding under each category must be context specific. Final categories recorded for each communication episode were the: purpose, and mode of communication; the target individual; and the length of time taken for each occurrence.

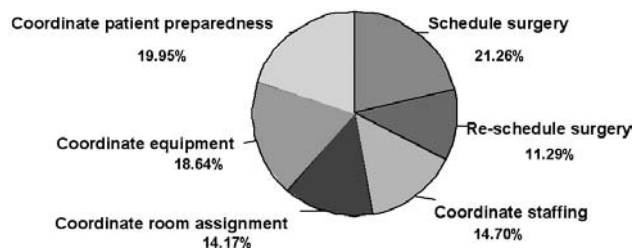


Figure 1 Frequencies of communication episodes by purpose of communication.

Data Collection

Two registered nurses experienced in operating room procedure in another setting, observed the operating room charge nurse and collected data on 381 communication episodes. Observations occurred during the operating room’s busiest time, in the morning, over 7 non-consecutive days. Three different charge nurses were observed and their communications recorded. The charge nurse usually remained at the ‘desk’, which can be likened to a command center. This is where the majority of coordination activities occur. This area consists of a long table situated in front of a 12ft by 4 ft wall-mounted public display board. The board is used to show the patient and staff operating room assignments. In addition, the area has a telephone with intercom and paging capability. The Charge Nurse occasionally moved away from her ‘desk’ to assess the progress of a surgery or to discuss room assignment face-to-face with the staff.

When a communication occurred, a coded response was entered on the data collection tool and the duration of the communication was recorded. When the observer was unclear about the purpose of the communication or the target person, the information was clarified with the charge nurse. Occasionally, the charge nurse voluntarily disclosed the information on the communication. This voluntary disclosure of information to the observer oftentimes occurred when the mode of communication was the telephone as it was difficult for the observer to discern the target person and the nature of the communication.

Results

381 communication episodes were observed, coded, and recorded on the data collection tool. Scheduling surgery was the most frequent purpose of communication (21%), with coordinating patient preparedness,

a close second (20%). Figure 1 shows the percentages associated with each purpose of communication.

The target persons of communication were most frequently OR nurses (37%), surgeons (17%), and floor nurses (13%). The vast majority (67%) of communications were face-to-face, then by phone (27%), pager (3%), and intercom (2%). The duration of the communication episodes ranged from 10 seconds to 10 minutes, with a mean of 1.13 minutes and a mode of 1 minute. 76% of the communication episodes were between 30 and 60 seconds in duration.

There was a relationship between the target person of the communication and the purpose of the communication (Chi Square, $p < .001$). For example, 78% of communication with surgeons was to schedule or re-schedule surgery, while 50% of communications with floor nurses was to coordinate patient preparedness. Table 1. lists the target person of communication by the most frequent purpose of the communication.

There was a significant relationship between the purpose of the communication and the mode chosen for that communication (Chi Square, $p = .002$). While the vast majority of communication was face-to-face (67%), 39% of phone communications were to schedule or re-schedule surgery and 26% to coordinate patient preparedness.

Also significant, was the relationship between mode of communication chosen and the target person of that communication (Chi Square, $p < .001$). 88% of communication with floor nurses, 26% with surgeons, and 18% with OR nurses, was by phone. Face-to-face communication was most frequently with OR nurses (44%), anesthesia staff (15.6%), and surgeons (15%).

Discussion

The purpose of OR charge nurse communication is to coordinate the activities of the operating room. Infor-

Table 1 ■

Target Person of Communication by the Most Frequent Purpose of the Communication

Target	Purpose
Surgeon (43%)	Schedule Surgery
Surgeon (34%)	Re-schedule
OR Nurse (31%)	Staffing
OR Nurse (31%)	Room Assignment
OR Nurse (15%)	Equipment
Floor Nurse (50%)	Patient Preparedness

mation is collected, processed, and finally represented on the OR board, a public display. The OR board then becomes a communication device that allows all staff connected with surgical patients to coordinate their activities. However, the fixed location of the board limits the staffs' ability to access and interact with the device. Therefore, the charge nurse becomes the collector and author of coordination information on the display board. At times, this interferes with the charge nurses' ability to coordinate other activities and they become 'tied' to the public display. The implementation of an electronic display of the OR board, via an internet or intranet, would increase the ability of the staff to access and update the board and free the OR charge nurse for other coordination activities.

An electronic representation of the OR board displayed on the hospital floors would decrease the need for phone communication with floor nurses. Coordinating patient preparedness currently represents 88% of the phone communication between charge nurses and floor nurses and 12% of the total communication with surgeons. Generally, this is to establish if the patient is ready for the OR or if the OR is ready for the patient. Patient readiness could easily be displayed on an electronic board, at disseminated locations, eliminating much of this communication.

Scheduling and re-scheduling surgery are other categories of communication that could be decreased with the implementation of an electronic board. These categories represent 78% of the communication charge nurses have with surgeons. Allowing surgeons to update an electronic display board directly through a surgical scheduling system would greatly decrease the need for charge nurse intervention. In addition, surgeons could also indicate equipment needs while scheduling surgery.

Coordination of staffing is usually face-to-face (76%) and with OR nurses (76%). However, we observed that this communication generally involved the OR nurses' discussing the status of surgical cases and their next room assignment. Again, disseminated electronic displays of the OR board might be utilized to decrease this communication.

As previously stated, the majority of communication was face-to-face (67%), however observation showed that usually this communication was initiated when staff came to view the OR board. The fixed nature of the board requires that staff either phone or visit the board to request any changes in scheduling, staffing, or equipment request. The advantage to visiting the

board is that staff are able to view an entire representation of OR status. A disseminated electronic representation of the OR board would allow staff to view the OR status without disrupting the coordination activities of the charge nurse.

Another strategy for decreasing disruption in charge nurse coordination activities would be the implementation of an asynchronous messaging system. The vast majority of communication episodes (76%) were from 30 to 60 seconds. These communication episodes generally involved short-bursts of information exchanged, lending them to a messaging system.

Nevertheless, due to the unpredictable nature of surgical workload in a trauma center, the charge nurse would still need to be constantly aware of the OR board status. Electronic alerts to changes in scheduling or equipment needs could be communicated to the charge nurses' and require their confirmation prior to OR board update. This would decrease the need for the charge nurse to be in the proximity of the board to be aware of and coordinate changes in workload.

While this discussion has proposed technological solutions for decreasing communication, more information is needed on the character of the communication episodes, before these proposals can be implemented. For example, coordinating activities in the OR requires negotiation. OR and hospital staff negotiate surgical and staffing schedules with the charge nurse. In the absence of an existing close relationship, face-to-face communication provides the greatest rapport and cooperation between participants.⁷ Removing this avenue of communication could decrease rather than increase the efficiency of OR coordination.

Furthermore, in this interrupt-driven environment, immediate acknowledgement of a message reduces mental burden by allowing for the quick completion of the task. This is especially true in this environment where the consequences of communication errors can be so significant; workers need explicit acknowledgement that a communication has been received. Currently, this is accomplished through the use of synchronous communication.

Finally, further investigation is required into the amount and type of peripheral information gained during communication episodes initiated for another purpose. We have observed that this information is frequently in the form of a 'heads up', or information concerning upcoming events. Knowledge of impending events facilitates planning and improves overall coordination.

Summary

Communication and coordination in the OR is the primary role of the OR charge nurse. This role must be understood prior to suggesting any technological solution designed to enhance OR coordination. The examination of OR charge nurse communication described in this paper is a portion of a larger study designed to explicate the communication and coordination practices of a large trauma center. Under study are those activities practiced by individuals and teams in trauma care. While a limited number of communication episodes were recorded in this portion of the study, we have demonstrated the usefulness of this methodology in practice. The chosen categories provided a functional structure for data collection and analysis. Through an understanding of these practices technological applications will be designed to facilitate coordination of patient care and decrease the potential for human error.

We would like to acknowledge the patience and cooperation of the OR charge nurses observed for this study. Without the contribution of Laurie Demers, Jane Rettalita, and Charlene Zecha this investigation would not have been possible. This research is supported by a grant for the National Science Foundation (IIS-990406). The views expressed here are those of the authors and do not reflect the official policy or position of the funding agencies.

Reprinted from the Proceedings of the 2001 AMIA Annual Symposium, with permission.

References ■

1. Dexter, F., Macario, A., Traub, R., Enterprise-wide patient scheduling information systems to coordinate surgical clinic and operating room scheduling can impair operating room efficiency. *Anesthesia & Analgesia*, 2000. 91(3): p. 617-626.
2. AORN Nurses, A Comprehensive model for perioperative nursing practice. *AORN Journal*, 1997. 66(1): p. 46-49.
3. Sonneberg, D., Life in the fast lane-helpful tips for OR charge nurses. *AORN Journal*, 1999. 69(5): p. 941-944.
4. Bismarch, W., Held, M., Is informal communication needed, wanted and supported?, in *Human-Computer Interaction: Communication, Cooperation and Application Design*, H.Z. Bullinger, J., Editor. 1999, Lawrence Erlbaum Associates: Mahwah, NJ. p. 477-481.
5. Wilson, R., Runciman, W., Gibberd, R., et al., The quality in Australian health care study. *Medical Journal of Australia*, 1995. 163: p. 458-471.
6. Donchin, Y., Gopher, D., Olin, M., Badihi, Y., Biesky, M., Sprung, C., Pizov, R., Cotev, S., A look into the nature and causes of human errors in the intensive care unit. *Critical Care Medicine*, 1995. 23(2): p. 294-300.
7. Bazerman, M., Curhan, J., Moore, D., Valley, K., *Negotiation. Annual Review of Psychology*, 2000. 51: p. 279-314.
8. Blum, N., Lieu, T., Interrupted care: the effects of paging on pediatric resident activities. *American Journal of the Diseases in Children*, 1992. 146(July): p. 806-808.
9. Coiera, E., Tombs, V., Communication behaviours in a hospital setting: an observational study. *British Medical Journal*, 1998. 316(7132): p. 673-676.
10. Katz, M., Schroeder, S., The sounds of the hospital: paging patterns in three teaching hospitals. *The New England Journal of Medicine*, 1988. 319(24): p. 1585-1589.
11. Fowkes, W., Christenson, D., McKay D., An analysis of the use of the telephone in the management of patients in skilled nursing facilities. *Journal of the American Geriatric Society*, 1997. 45: p. 67-70.
12. Parker, J., Coiera, E., Improving clinical communication: a view from psychology. *Journal of the American Medical Informatics Association*, 2000. 7(5): p. 453-461.
13. Chase, S., The social context of critical care clinical judgement. *Heart & Lung Journal of Critical Care*, 1995. 24(2): p. 154-162.
14. Patel, V., Kushniruk, A. Interface design for health care environments: the role of cognitive science. in *Proceedings / AMIA Annual Symposium*. 1998.