An Analysis of Inpatient Nursing Communications Needs

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Abstract

The health care environment is communications and information intensive. Nurses especially have communications as part of their routine activities, yet little is known about specific nursing communications needs and technologies that might address these needs. This project analyzed the specific communications needs of nurses at Massachusetts General Hospital (MGH) in Boston, MA, through focus group meetings, nursing staff interviews, and direct observation of unit communications. Based on these data, an ideal requirements list for a nursing communication system was created. Data were also gathered and analyzed from units piloting cell phones as nursing communications tools. On non-cell phone units we found that the bulk of communication activity is from the front desk operations associate to the nurse through a sub-optimal overhead paging system that is often unclear or inaudible. The pilot of cellular phones has demonstrated improvements in nursing communications at MGH and there are indications that other emerging technologies will be better able to address the ideal communication needs of nurses.

Keywords:

Communication, telecommunications, nursing, needs assessment, cellular phone

Introduction

The healthcare workplace is a complex communication environment involving a large number of people and unexpected events. The unpredictability and complexity of this environment means that providers must constantly communicate with each other to be aware of the current states of patients and upcoming plans. Unfortunately, failures in healthcare communication have been reported as a large contributor to adverse events and outcomes. Communication error was determined to be the leading cause of death in a retrospective review of 14,000 in-hospital deaths in Australia, twice as frequent as errors caused by inadequate clinical skill [1]. In another study focusing on errors in the intensive care unit, 37% of the errors were attributed to communication problems between physicians and nurses [2].

The ability of clinicians to communicate directly and effectively with one another is critical to successful patient care. Even in a hospital with a mature electronic medical record system, it has been reported that face-to-face clinicians interactions account for about 50% of all information transactions [3]. Despite the importance of direct communication and also the fact that communication errors are frequent and potentially deadly, communications is an area that is often ignored in informatics [1]. Although some work has been done in telemedicine to address communication problems, it has often been driven by the introduction of technology rather than an understanding of the needs of clinicians [4].

One particularly communications-intensive area of healthcare where needs should be assessed is inpatient nursing. Nurses are responsible for the minute-to-minute care of patients and must be able to communicate with multiple parties including patients, other nurses, pharmacists, physicians, other ancillary healthcare workers, and others outside the care environment. Several technologies are available to assist nursing-related communications. "Nurse call" systems that provide the patient with intercom capability have been used for many years, but typically only address patient-front desk communications. Overhead paging systems have also been used for many years for desk-nurse communications. Other technologies such as two-way radio, wireless telephones, email, and pagers, have addressed desk-nurse, nurse-nurse, and nurse-physician communication. There have been few studies however, that address the effectiveness of these technologies and more importantly, seek to understand the specific communication needs of nurses.

Nursing leadership at the Massachusetts General Hospital (MGH) in Boston, MA, identified "improved communications" as one of three top nursing-related initiatives, along with improved patient safety and improved nursing efficiency. As part of this initiative, wireless telephones were selected as a technology to help nurses communicate more effectively. Nursing staff at MGH began piloting wireless cell phones on a small number of units in the summer of 2000. Even though MGH nursing leadership is proceeding with full-scale deployment of wireless telephones it felt it could better understand the detailed communications needs of its nurses and to what extent cell phones would help solve some problems, leave other problems unsolved, and perhaps create some new problems. To this end, it sponsored a research project to improve understanding in this domain.

Specifically, the goals of the research presented in this paper were to: (1) document current nursing communications activities and problems, (2) determine the requirements of an ideal nursing

communications system, (3) perform a gap analysis on the wireless telephone pilot implementation at MGH, (4) investigate other technologies to potentially address the user requirements, and (5) provide recommendations to MGH nursing leadership for future planning.

Methods

Setting

The study took place primarily at Massachusetts General Hospital (MGH), an 890-bed academic medical center in Boston, MA, that is part of Partners HealthCare System. Partners is a $4.5B integrated delivery network in Eastern Massachusetts that includes MGH, Brigham and Women's Hospital (BWH), several community hospitals, and a large physician network. MGH is comprised of 38 inpatient nursing units and each year the hospital admits approximately 42,000 inpatients and the surgical staff performs more than 32,000 operations.

Study Overview

Our analysis consisted of focus group meetings with nursing and nursing leadership staff, interviews and direct observations on nursing units, and research on technologies to assist nursing communications.

Focus Groups

We conducted one focus group meeting with staff nurses from various inpatient units and 2 focus group meetings with nurse leaders. The goal of the focus group meetings was to understand nurses' and leadership perspectives on nursing communication challenges, requirements for an ideal communication system, and how the implementation of cell phones might address these requirements. Staff nurses and nurse leaders were invited via e-mail. The focus group meetings were one hour long and co-led by the project investigators. These one-hour long meetings were audio taped, transcribed, and common themes were identified.

Interviews

One investigator (DT) met with 15 nurses, 10 operations associates (OAs), and 7 nurse managers on 14 of the 38 inpatient MGH units to verify and elaborate upon the issues discovered in the focus group meetings. The 14 units were chosen to be representative of the MGH as a whole. Approximately 20 minutes was spent on each unit performing unstructured interviews with available staff. Generally, on each unit at least two staff members in different roles were interviewed. Data were gathered on current communications problems, the staff's perceived needs, and communication flow around the unit's front desk.

Interviews were also conducted with nursing staff on 3 other MGH units utilizing wireless communication technologies. A nurse manager was interviewed on an outpatient cancer infusion unit utilizing a wireless telephone system with a dedicated wireless infrastructure. The other two units (general medicine unit and a plastic surgery and burn unit) were piloting the use of standard cell phones by nurses. Semi-structured interviews were conducted with a total of 7 nurses and one nurse manager on

these 2 units (1 hour per unit) to collect data on the staff's experience with the wireless phones.

In addition to the analyses at MGH, two investigators (GK and DT) conducted 20-minute telephone interviews with nurse managers from Brigham and Women's Hospital and Newton-Wellesley Hospital (NWH), a 300-bed Partners community hospital, to compare whether there were similar communication-related issues at these other hospitals as there were at MGH. DT also spent one hour each on an obstetrical unit and cardiac unit at BWH conducting unstructured interviews and observations similar to those at MGH to determine the current communication patterns and difficulties.

Observations

DT conducted direct observation of communication events on 5 nursing units from both the OA and nurse perspective. One hour was spent on each of 3 units (general medicine and surgery) observing communication events around the front desk involving OAs. During the day shift, 2 of the 3 units had 2 OAs on duty and the third had 3 OAs. For these observations a communication "event" could be composed of: (1) an *incoming* phone call or nurse call, (2) an *outgoing* overhead page, phone call, face-to-face conversation, or text page, or (3) a combination of (1) and (2). We documented the total number of incoming and outgoing communication events from the desk, the communication methods utilized for each event (e.g., telephone, face-to-face, overhead page), and the parties involved in these events. The content of each communication event was not determined in many cases because the OAs did not ask callers to identify themselves.

Two nurses on separate units (general medicine and vascular) were also shadowed and similar data were collected, although incoming communications were defined to include overhead pages and face-to-face conversations. Also, the content of the communication events was noted.

Requirements Development, Gap Analysis, and Marketplace Survey

After gathering subjective and objective data on communication patterns and problems a list of functional requirements for an ideal nursing communications systems was created. These requirements were then compared with the current capabilities of the cell phone system being piloted. We also investigated other communications technologies that would address these requirements through Internet searches on wireless telecommunications and a literature review.

Results

Focus Groups

Approximately 15 nurses attended each of the 3 focus group meetings. The first meeting with staff nurses confirmed that there were significant communication problems on their units and that they were interested in finding solutions. The most important problem was the use of the overhead paging system by OAs at the front desk to contact nurses. The overhead paging system increases the background noise level on the unit and is a concern of staff and patients because it is loud and agitating. In

addition, the clarity and volume are not consistent everywhere on a unit and nurses often miss messages. Subsequently, callers trying to reach nurses by phone have to wait on hold for long periods of time and the OAs have to spend time physically hunting for the nurses.

Nurses also indicated that asynchronous technologies such as email or voicemail were not useful for clinical communication because there is no time during the work shift to check messages more than once or twice.

One nurse from a unit piloting wireless phones gave a report on the unit's experience with the technology. She described a challenge in that wireless phones can make nurses very available but she agreed that nurses could turn off the phones or set the ring to vibrate if they do not want to be interrupted. As major benefits, the cell phones alleviate much of the noise of the overhead system and they allow acknowledgement that a communication was received.

In the second and third focus group meetings with nurse managers the same themes were repeated—overhead problems with acknowledgement, redundant calls, and wasted time trying to locate individuals. Nurse managers expressed the desire that the ideal communications device must allow the user to be "unavailable," when an interruption cannot be tolerated, and also the ability to take calls "hands-free."

Figure 1 contains quotes from MGH nursing staff on communication problems from the focus group meetings and figure 2, nurses' experience with wireless phones on certain units at MGH.

Interviews

Interviews confirmed the findings of the focus groups. In addition, nurses on one unit had tried text pagers to improve communications, but delivery delay times of up to 3 minutes caused problems. OAs on this unit also complained about the vagueness of preset "pick-list" text messages and the time required to type text messages to nurses. A general theme was that any on-unit communication method more labor-intensive than voice was just too slow, complicated, and inefficient. For off-unit communications, text messaging from nurses to physicians is common and perceived by nurses as worth the time spent typing.

> **Overhead paging system:**
> "[We asked patients] 'What do you dislike the most [about your care]?' I could not find a patient who did not say the overhead."
> **Email:**
> "I was off for one day; I came back to 37 emails...There were about two that were pertinent.. [that] I didn't get until two days later even though I was working because I didn't have the time [to go through them]."

Figure 1 - Quotes by MGH nursing staff in focus group meetings on communication problems

Nursing staff had favorable comments about a wireless, two-way radio device with a lapel speaker/mic that had been used at MGH in the past. Although heavy and cumbersome, the device was simple to operate, fairly hands-free, and nurses liked being able to communicate directly with the desk or send out an "all-call" to their co-workers. The use of the device also diminished the noise level on the units. However, the company that produced them is no longer in business so another solution is required.

> Wireless phones:
>
> "The good side is it has cut down on the overhead. It is quiet...and that is the objective. The bad news—sometimes it makes people too available and they get overwhelmed when a lot is going on."
>
> "...the staff nurse will page the doctor to her phone and the doctor will call her right back. It has taken a tremendous amount of calls away from our front desk, because we were losing telephone calls. People were on hold forever. Doctors were mad, nurses were mad, all the time...now...the phones are so vital to our operations, day to day."

Figure 2 - Quotes by MGH nursing staff in focus group meetings on their experience using wireless phones on certain units

A nurse manager in the outpatient cancer infusion unit using a proprietary wireless phone system stated that the phones are heavy and "ring all the time," but also that the staff "wouldn't know how to live without them."

On the medicine unit piloting standard cell phones nurses said the noise level was reduced, acknowledgement was improved, and it was easier to communicate with others on the unit. The nurses primarily use the cell phones to receive messages from OAs and rarely to take incoming calls from off the unit or to make outgoing calls.

Nurses on the plastic surgery and burn unit described some of the challenges they faced when starting the cell phone pilot. Previously a nurse could keep track of the other nurses' workload by listening to overhead messages and assisting those that are busy. With cell phones nurses did not know what other nurses were doing. In addition, they needed to work closely with the OAs on the unit to determine which calls would be forwarded to the nurses and which ones the OA could triage.

The telephone interviews with nurse managers at BWH and NWH revealed overhead paging system problems similar to MGH. An obstetrical unit at BWH had nurses carry pagers at one point in time but message delivery delays were intolerable. Also, at NWH 4 units have been using a wireless telephone system similar to the MGH cancer infusion unit for approximately 2 years with mixed reactions.

Observations

Data from the observation of communication events at the unit desk were consistent with focus group meeting and staff inter-

view data. The front desk area of the 3 units visited was often busy, loud, and chaotic. In order to work around the limitations of the overhead system, an OA may ask a nurse via the overhead to "light her location." The nurse will respond by using the nurse call system in the patient room. However, for various reasons, it is sometimes difficult to hear nurse call messages making communication with a patient or nurse challenging. Table 1 contains a summary of the front desk observation data.

Table 1: Number of communication events in 1 hour at 3 different medical unit front desks at MGH

	Unit 1	Unit 2	Unit 3	Mean
Total "events" in 1 hour	60	40	80	60
Incoming phone calls	29	21	59	36
Incoming nurse calls from patients	17	5	10	11
Total outgoing messages	50	27	37	38
Outgoing overhead pages	33	14	32	26
Outgoing communications to nurses	36	20	35	30

There was a mean of 60 communication events in one hour. The observations were performed between the hours of 10am-12pm and 1-2pm on a single day. Nurse managers on each unit informed us that the volume of communication observed on that particular day was lower than normal. Thirty-six of the 60 total communication events involved incoming phone calls to the unit desk. Eleven incoming communications were nurse calls from patients. In terms of outgoing communications, there was a mean of 38 outgoing messages. Of these 38 messages, 26 (or 70%) were via the overhead paging system. Also, 30 of the 38 outgoing messages (or 80%) were directed to nurses.

Data were also collected through 30-minute observations of 2 nurses on different units. On the first unit (medicine) the nurse received 3 overhead pages during the 30-minute time period and was involved in 3 face-to-face interactions with other clinicians. On the second unit (vascular) the nurse received one overhead page during the 30-minute time period and was involved in 3 face-to-face interactions with other clinicians.

Discussion

Observation at MGH unit front desks confirmed that there was indeed a high volume of communication activity and that overhead paging was frequent and problematic. Interviews also revealed that asynchronous technologies such as pagers caused delays and inefficiencies, which has been documented elsewhere [5]. Based on nursing and OA staff comments and our observa-

tions the following are requirements for an ideal nursing communications device:

- Smaller and lighter than most cell phones
- Wearable
- Wireless
- Durable
- Simple to use, as few buttons as possible
- Can be cleaned or sterilized
- Caller ID
- Text message display
- Can receive calls "hands-free" via easy-to-hear speaker/mic
- Earphone not required but able to use for private communication
- Battery life long enough for multiple shifts
- Can indicate "unavailability" and defer calls
- Interrupts gently when a call comes through
- Can connect with another individual but also communicate a message to a group
- Can route calls from nurse call system directly to device (night shift)
- Allow user to call other staff by name or role (as opposed to extension number)
- Able to share device across multiple shifts but keep identity of user separate from device

These requirements outline an ultra-small, simple to use, voice-oriented device. They are also based on the assumption that the OA would still perform a triaging or filtering function for most calls coming into the unit. These requirements are more akin to the two-way radio device that was used previously in the hospital than a wireless phone, although there is certainly overlap in functionality.

Wireless phones have demonstrated an ability to alleviate some of the problems encountered with the overhead system. Nurses acknowledge that the cell phones are superior to the overhead paging system in that they provide acknowledgement and reduce noise on the floor. However, some expressed the desire that the devices could be smaller, lighter, easier to operate, and enable hands-free use.

One of the last steps in the study was to survey the marketplace and literature for telecommunications technology that might address the requirements better than the standard cell phone solution. One example is a tiny, wearable, voice-controlled device produced by Vocera Communications [6] that operates over a wireless LAN (802.11b). This communication "badge" contains a speaker, microphone, and an LCD display for caller ID or text messaging. The accompanying server software utilizes user-independent speech recognition and users can call other users by name, role, group, or by location. It was interesting to find that the Vocera system appears to address many of the same requirements we determined from our study data.

In addition, cell phone service providers such as Nextel [7] and Verizon Wireless [8] offer "push-to-talk" services that combine

the functionality of a cell phone and a two-way radio. A phone utilizing this technology could be used as a "walkie-talkie" to connect with either a single coworker or group of coworkers, depending on the communication need. This technology has been commonly used in other industries for group communication and the flexibility of this type of system may be promising for nursing communications.

The survey of the marketplace confirmed that others are thinking about these issues in the same way—that there is need for instant voice-based synchronous communication in the healthcare workplace and that technology should support this need more efficiently. Parker and Coiera [9] state that new synchronous technologies such as these, on their own, will not resolve the problems created by an interruptive work environment, but that there would be probable benefits from moving some synchronous methods to more asynchronous methods such as voicemail and email.

We agree that synchronous technologies on their own will not solve the problems of interruption to workflow and in fact, cell phones or even a solution based on the "ideal" requirements could have the potential to cause more interruptions than currently exist with the overhead system. We also agree that using asynchronous technologies may provide benefits for certain types of clinical communications and in certain environments. However, for the nursing units we studied, synchronous voice-based communication was perceived as a necessity. Voicemail, email, text paging or messaging, and instant messaging were just not convenient enough for most minute-to-minute nursing communication needs. Some of these strategies may play an auxiliary role, but enabling better synchronous communication between OAs, nurses, and other clinicians should be the primary concern on these units.

Although this research represents a relatively high-level analysis of nursing communication issues there are certainly implications for future work. Broadly, topics of focus may include: exploring more deeply the link between adverse events and communication problems, investigating more closely the actual content of communication and how communication needs can be anticipated and handled more efficiently with asynchronous strategies, and better understanding what communications should be occurring but currently are not. It would also be relevant to study how workflow redesign and communications are integrated and can be improved, security and confidentiality of patient information, and ergonomic analyses for device design. At a more practical level, it would be worthwhile to conduct a before/after study around the implementation of a communication technology such as cell phones to measure communication event volumes and nurse and patient satisfaction levels. Finally, considering there is often resistance or reluctance to adopt new technologies, another study might address issues around maximizing the chances that a new communication technology will be adopted successfully.

Conclusion

The quality of health care can be compromised by sub-optimal communications. Nurses especially must communicate frequently with each other and with other members of the health care team to remain aware of changing circumstances. The current state of communications for nurses leaves much to be desired. Cellular telephone technology can improve nurse communications, but many of the requirements of an ideal nursing communication system are not addressed by a cellular system. New technologies are emerging that are specifically targeting the communication needs of nurses so the capability of technology to support nursing communications needs should improve over the next few years. However, it is clear that much work remains to better understand nursing communications and the potential for improving quality of care and nurse and patient satisfaction.

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