Feature—Evolution of HSR

Interdisciplinary communication: An uncharted source of medical error?

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Article Outline

1. Introduction

Medical error and patient safety have become important issues and are reported to be the 8th leading cause of death among Americans [1]. There is a growing understanding that the clinical environment and clinical processes—not individual clinicians—are the major contributors to medical error. The purpose of our analysis was to focus on one aspect of the systems approach to error—the role of poor communication among clinical disciplines as a cause of medical error.

Organizations such as hospitals are complex structures that use a multilayered approach to communication. Paging systems, telephones, e-mail, fax, and face-to-face interactions are but a few of the modes of communication that medical providers use in caring for their patients. This "communication space" is huge in terms of both the total information transactions and the clinicians—"the biggest information repository in health care lies in the people working in it, and the biggest information system is the web of conversations that link the actions of these individuals. It is through the multitude of conversations peppering the clinical day that clinicians examine, present, and interpret clinical data and ultimately decide in clinical actions" [2].

People have been pointing out the existence of poor communication in clinical practice for years. A report 25 years ago suggested that 15% of human error was attributable to communication problems [3]. The Harvard Medical Practice Study [4], the Quality in Australian Health Care Study [5], and the Institute of Medicine report [1] all revealed that ineffective communication is a significant factor in medical error. Researchers in family practice [6], emergency medicine [7], [8] and [9], anesthesia [10], and the intensive care unit (ICU) [11] all make pleas for better team communication. Numerous case reports and editorials stating that good communication is paramount and that all efforts should be made to improve communication have surfaced emphatically [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23] and [24]. Regrettably, there is neither an adequate definition of *good* communication nor an attempt to quantify communication as meeting minimal criteria for effectiveness. Indeed, very limited research on what type of communication actually occurs between health professionals exists.

2. Methods

We performed a literature review using the MEDLINE, EMBASE, PsycINFO, and CINAHL databases. The following keywords were used: "communication," "communication barriers," "medical error," "medicine," "human factors," "inter-professional relations," and "interdisciplinary communication." The search was limited to articles written in the English language; those focusing on doctor-patient or nurse-patient communication were excluded. Although health care staff–patient communication is paramount, it was not the focus of our analysis. Published articles that were deemed to be opinion pieces, letters, editorials, and reviews were also excluded. There was no limit to the accepted publication year.

3. Results

Errors can be classified as active if their effect is felt almost immediately. Conversely, latent errors can be dormant within a system; these latent factors often pose the greatest risk and are responsible for much of the human error in the workplace [25]. Most studies cite communication as a perceived important source of latent error and offer generic "improve teamwork communication" advice [5], [6], [9], [10] and [26]. In a recent survey, more than 80% of medical

staff reported that perioperative discussions are an important part of safety and teamwork [27]. The most vital recommendation from people working in this operating theater was to improve communication. The authors concluded that future research should focus on effective teamwork and communication.

However, few studies attempt to discover the actual reasons for communication failures. A noteworthy exception is a Canadian ethnographic study on communication failures in the operating room [28]. This study included 48 surgical procedures comprising 90 hours of observation time. Lingard et al [28] defined 4 main communication failures, all of which affected 30% of all communication events recorded! Although there was no visible effect in most deemed communication failures, 36% of failures resulted in visible system processes such as team inefficiency and tension, time delay, and procedural error. These feelings of tension have been shown in earlier work by the same group [29] and [30]. Time constraints and ambiguity have been shown to be a significant source of stress between communicating health care staff in other medical domains [31] and [32]. A study on oncology patients found that an explicit checklist sheet in the medical chart improves communication among different specialties taking care of the same patient [33]. Risser et al [8] studied communication failures in an emergency department and attempted to provide targeted advice.

3.1. Clinical communication patterns

In an exploratory study to identify patterns of communication behavior among hospital-based health care workers, 8 physicians and 2 nurses were observed in a medical ward in the United Kingdom [34]. The study specifically looked into communication between nurses and doctors and found that nurses initiated 16 of 20 events. Of interest, there was a bias toward synchronous communication (ie, immediate contact with another person). This is apposed to asynchronous communication through means such as e-mail, notes, or voice message. The study was later repeated in Australian emergency departments and found that clinicians spent more than 80% of the observed time in communication acts and that most acts were face to face [35]. A study on operating room charge nurses found similarly high levels of communication time and face-to-face preference [36]. Moreover, 30% of all communication events were considered interruptive and 10% of communication time involved multitasking [35]. Other studies have also shown high levels of interruption and multitasking when health care staff speak with each other [37], [38] and [39].

3.2. Communication studies in the intensive care

A recent trend in the ICU literature has been to discuss communication skills. Critical care physicians, by the nature of their patients, spend much of their clinical time speaking with patients and their families. Most families rate clinicians' communication skills, along with accessibility, as more important than their clinical skills [40]. Studies investigating the adequacy of physician communication skills with families of critically ill patients have been disappointing [41], [42] and [43], although 2 recent studies have been more favorable [44] and [45]. Unfortunately, although the critical care literature considers communication between physicians and patients as well as their families, limited attention is given to the doctor-nurse conversation.

The Australian Incident Monitoring Study in Intensive Care showed that communication was a leading contributing factor to preventable adverse events [46]. Despite an apparent need to investigate what constitutes good communication and the mounting evidence that physician-nurse collaboration improves patient outcomes in critical care medicine [47], [48], [49] and [50], not much has been done in this field. This may be in part related to the fact that doctors and nurses have very different views on how well they are communicating with each other [51], [52], [53], [54] and [55]. A recent study provided hope that collaborative communication can be learned [56]. A series of ethnographic studies on nurse-physician communication during ICU rounds revealed some interesting dynamics [57], [58], [59] and [60]. Although junior doctors sought the advice of senior nurses, the nursing staff consistently felt undervalued, experienced barriers to participating in decision making, were interrupted more frequently, and were reminded of the power differences in their relationship. Recent studies have shown that nurse participation in ward rounds and explicit communication can improve the feelings of teamwork and satisfaction among ICU staff [61], [62] and [63].

Donchin et al [64] studied an Israeli ICU over 4 months in hopes of investigating the nature and causes of human error. A physician or nurse filled out an error report as an error was discovered. A 24-hour continuous bedside observation conducted on a randomly selected group of 46 patients generated activity profiles. Each interaction, regardless of time required, was counted as a single interaction. There were 8178 activities (178 per patient per day) during the activity profile. Verbal communication was observed in only 291 activities (9%). Most communications were exclusively among physicians or exclusively among nurses. Only in 60 of the recorded activities (2%) did doctors communicate verbally with nurses! Verbal communication between physicians and nurses was observed in 205 of the error reports (37%). This rate is surprisingly high when contrasted with the finding that verbal communication between nurses and physicians was observed in only 2% of the activities. The authors cautioned the interpretation of these results because their study was a single-center trial and did not include a control group. Nevertheless, these results clearly stress the importance (and lack) of good communication for the transfer of information between doctors and nurses. A recent Australian study on ICU ward rounds showed that staff spent 75% of their rounds in conversation and that 97% of communication was done face to face [37]. Also, there was a high degree of interruption that was not appreciated by the staff.

3.3. How could communication be a source of latent error?

Many of the articles discussed demonstrated that clinicians spend most of their clinical time in communication. Moreover, there appears to be a high rate of interruption in both acute and non-acute settings [34], [35], [37], [38], [39], [65], [66], [67], [68], [69], [70] and [71]. Kirmeyer [72] was the first investigator to use an observation method to document how interruption in the workplace could be a source of *cognitive overload*. This original article studied artificially imposed interruptions on police radio dispatchers and demonstrated increased objective and subjective workloads. Kirmeyer [72] conceptualized "interruption as an uncontrollable and unpredictable stressor that results in information and cognitive fatigue. When interruption causes an employee to leave tasks unfinished, these tasks act as distracters and further effort is required to inhibit attention to them while processing new inputs."

Authors such as Rasmussen [73] have asked the medical community to analyze nontraditional sources of latent error, namely, interruption from co-workers as well as conflicting and excessive task demands. Work overload has long been shown to negatively affect employee productivity and incite feelings of tension, anger, and personal failure [74] and [75]. Pager interruptions contribute to sleep deprivation in medical residents and increase feelings of stress and work inefficiency [76] and [77]. Pharmacists cited interruptions as one of the most important contributing factors to drug dispensing errors [78] and [79]. Interruptions at work and home were shown to be predictive of high levels of job dissatisfaction and mental well-being for British physicians [80]. Cooper et al [80] suggested that the number of workplace interruptions may be an important ergonomic factor contributing to inefficiency, stress, and increased error. There already exists proof that communication failures affect a team's ability to work efficiently and effect optimal patient care [28] and [30]. Moreover, an Australian study showed that emergency physicians were reducing their working hours in response to work overload and stress, a finding with important implications for professional longevity and workforce planning [81].

The aviation industry has also recognized the consequences of interruption as evidenced by a study examining the typical operations involved in the preflight phase of flights [82]. That study found that interruptions dramatically increase opportunities for errors because distractions threaten to sidetrack even the most meticulous and experienced pilot. Dismukes et al [83] suggested treating interruptions as red flags and advocated methods to reduce the danger of interruptions toward pilots. An analysis of the Tenerife air disaster proposed that miscommunication coupled with interruptions of important routines was among some of the leading root causes of the tragedy [79]. Cook and Woods summarized the plausible repercussion of interruptions in the medical domain: "the physician whose attention is constantly shifting from one item to another may not be able to formulate a complete and coherent picture of the state of the system" [84]. Then again, not all interruptions are necessarily bad, unwanted, or unproductive. In fact, interruptions alert clinicians to priority or dangerous conditions that demand their immediate attention. The danger is when the number of interruptions cripples a physician's ability to prioritize incoming information.

4. Discussion

Why is studying communication in the ICU important? Few clinicians would argue that the ICU is a stressful place to work in and that the most sick patients reside within the ICU. Eisendrath et al [85] prospectively studied medical officers in an ICU and asked them to compare their stress level with that in non-ICU rotations. Not surprisingly, the 26 physicians rated the ICU as more stressful. When asked how they coped with stress, talking with other house staff ranked only second to humor. The complexity of multiorgan physiology, combined with sophisticated technology, poses a threat to physicians entering the ICU for the first time. An established (yet often overlooked) finding in stress research is that an individual's thought processes and breadth of attention narrow as stress or arousal increases [27]. That the complexity of a system is an important determinant of the likelihood of error is also an established finding [86]. Mistakes are more common when a clinician is inexperienced and when new techniques are introduced [87], [88] and [89]. Among pediatric patients admitted to a British hospital, drug errors were 7 times more likely to occur in the ICU than elsewhere [90]. Furthermore, more drug errors occurred in this pediatric ICU when new doctors joined the rotation. The Harvard investigators found that

adverse drug events occurred more often in medical or surgical ICUs as compared with either general medical or surgical wards [4]. Similarly, the Quality in Australian Health Care Study showed that a greater risk for death and adverse events was associated with patient complexity, illnesses requiring urgent care, and use of interventions thought to be potentially life-saving [5].

Studies have shown that graduates identify communication skills teaching as lacking and are critical of their teachers' abilities in demonstrating interviewing and interpersonal skills [91] and [92]. One study showed that junior staff withdraw from communicating in response to stress or mimic their mentor's aggressive style, further fueling tension among staff [30]. Certainly, there has been a trend in medical schools and health organizations to assess and teach communication skills [93], [94], [95], [96], [97], [98], [99] and [100]. However, not all institutions from different countries are restructuring their medical curricula to highlight communication skills [101] and [102]. Interesting, the personality and sex of medical students, including teaching style, may influence the success of teaching communication skills [103] and [104]. Maybe we are yet to see the effects of communication skills teaching downstream? However, the same question arises: are newly equipped medical school graduates going to practice their communication prowess or will other factors influence their ability to communicate effectively?

How could interruption contribute to medical error? We need to first define interruption then look toward the constructs of human memory for a possible explanation. Interruption has been defined as an uncontrollable and unpredictable stressor that produces information overload, requiring additional decision-maker effort [105]. Furthermore, interruptions typically require immediate attention or action. For simplicity, memory can be divided into 2 broad categories: long-term and short-term memory. Long-term memory typically refers to the general store of conceptual and factual knowledge as well as experiences framed in our own context [106]. Because it is explicit, long-term memory is usually inactive and not a current focus of attention unless activated. On the other hand, short-term or working memory is a combination of attention as well as concentration and requires conscious participation. It refers to the ability to temporarily maintain and manipulate information that one needs to keep in mind [106]. Working memory possesses some characteristics that make it vulnerable to interruptions [107]:

1. Working memory is extremely limited in its capabilities, and the number of items that can be held in working memory is small
[108]
.

2. Working memory is notoriously the weakest part of cognition, and items in working memory are easily disturbed by one another

[25]
.

3. Working memory is also limited in duration—evidence show the powerful negative effects of both interference and diversion of attention on working memory

[72]

,
[109]
and
[110]
.

It is not difficult to understand that taking care of complex patients such as the ones who reside in the ICU requires a high cognitive load and significant mental attention. It is therefore conceivable that a high degree of interruption could be a "tax" on a physician's working memory, thereby disrupting it [35] and [110]. This tax may be subtracted from the ability to remember important tasks or digest relevant incoming information. In the ICU, the failure of working memory should raise concern. If interruption threatens to disrupt working memory, then medical staff are at risk of forgetting patient tasks. Besides omission, medical staff may repeat tasks, leading to inefficiencies or harm (eg, drug duplication). Tasks are often related or sequential (eg, microbiological cultures before antibiotics or adequate analgesia during a procedure). It is easy to see how these slips and lapses can add up to patient harm. Critical thinking may get lost in an interrupt-driven workplace. The implication is simple: more interruptions may equal more medical error.

5. Conclusion

The ICU is a stressful place to work in, and members new to the ICU team feel stressed and make more errors. It is clear that medical error is more influenced by systemic factors rather than by human characteristics. The chance of latent error increases as the more complex, opaque, and tightly coupled a system becomes. We also know that error and adverse events in the ICU contribute to patient morbidity and mortality. Because conversation is vital for physicians but communication may be a possible source of latent error, it appears prudent to study the ICU to determine patterns of communication. In particular, studies should focus on preferences of communication and determine if interruptive conversations dominate the workplace. Before we attempt to implement an intervention to decrease a possible source of medical error, it would be prudent to first describe and understand the phenomenon.

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