Understanding Human-Computer Interactions in Intensive Care Unit Clinical Communication

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ABSTRACT

Clinical communication failures are considered the leading cause of medical errors (Bates et al., 1997). The complexity of the clinical culture and the significant variance in training and education levels form a challenge to enhancing communication within the clinical team. In order to improve communication, a comprehensive understanding of the overall communication process in health care is required. In an attempt to further understand clinical communication, the authors conducted a thorough methodology literature review to identify strengths and limitations of previous approaches. Their research proposes a new data collection method to study the clinical communication activities among Intensive Care Unit (ICU) clinical teams with a primary focus on the attending physician. In this paper, the authors present the first ICU communication instrument, they introduce the use of database management system to aid in discovering patterns and associations within our ICU communications data repository, and they present the authors’ Human-Computer Interaction observational study results. The authors have identified and analyzed key Human-Interaction behaviors and tools in the ICU in addition to refining the clinical communication model they previously proposed (Khairat & Gong, 2010b). Their goal is to build an exhaustive knowledge representation of the clinical communication process through utilizing an ontological approach.

Keywords: Clinical Communication Failures, Clinical Culture, Data Collection, Human-Computer Interaction, Intensive Care Unit (ICU), Intensive Care Unit Communication, Medical Errors

1. INTRODUCTION

Without a doubt patient safety has been the utmost focus of many clinicians and clinical researchers. It is evident that patient safety levels are strongly tied with the frequency of medical errors. The impact of medical errors on patients varies from near misses to injuries or deaths. The Institute of Medicine (IOM) (Kohn, Corrigan, & Donaldson, 2000), the Harvard Medical Practice Study (Brennan et al., 2004), the Quality in Australian Health Care Study (Wilson, Runciman, Gibberd, Harrison, Newby, & Hamilton, 1995), all state that inef-
cient communication is a significant factor in the occurrence of medical errors. By deduction, the quality of clinical communication is an essential factor towards error-free practices and safer patients. This paper aims to introduce a novel approach to further understand clinical communication by: (1) studying previously used methods, (2) developing a hybrid research instrument, and (3) utilizing informatics to collect, organize and analyze our clinical communication observations data repository. In this hypothesis-driven research, we hypothesize that there is a relationship between the communication skills of a lead physician and the level of understanding among the clinical team, through analyzing Human-Human and Human-Computer interactions.

This research refers to patient safety as the concept of patients receiving care services free from accidental injuries. The term medical errors are defined as preventable adverse events that can result in near misses, injuries, or death. Furthermore, we define clinical communication as the exchange of ideas, messages or knowledge between two or more entities through verbal, non-verbal, written, and visual forms where entities represent clinicians or technological components. Because health care includes communication through clinicians and computers, to encompass human-computer and human-human interactions our definition uses the term “entities” to refer to both clinicians and technology aided-devices.

Clinical communication occurs through four channels as defined. Verbal communication is the use of words, languages, sounds, and speaking to convey a certain set of messages. Non-verbal communication focuses on physical ways to communicate including body posture, facial expressions, and gestures. Written communication forms refer to various documented message exchanges such as handwritten notes and computerized or typed notes. Finally, visual forms of communication represent information exchange through visual aid instruments such as X-rays, charts, and graphs in a clinical setting.

1.1. The Effect of Communication in Health Care

Clinical communication is reported as the main cause for 75% of medical errors and 65% of sentinel events (Institute of Medicine, 1999; The Joint Commission, 2007). Medical errors are the 8th leading cause of death among Americans (Kohn, Corrigan, & Donaldson, 2000) exceeding motor vehicle deaths. As such there is an obvious necessity to improve the quality of care by focusing on the causes of medical errors, namely clinical communication. In 2006, the IOM stated that at least 1.5 million preventable adverse drug events occur annually in the United States as a result of medication errors (Burke, 2007). With communication being reported as the main cause behind these errors, there is a strong association that shows that high levels of effective communication result in lower medical errors, and in turn, improved patient safety outcomes.

The remarkably high volume of injuries has a significant impact on individuals’ well-being as well as the overall population health status, and the efforts of researchers should be directed towards eliminating major health care challenges. However, the heavy financial burden created by health care injuries must be a secondary motive, after medical errors, for new research-driven solutions as well. The IOM reported that preventable health care-related injuries cost the economy from $17 to $29 billion annually, of which half are health care costs (Institute of Medicine, 1999). Therefore, by minimizing medical errors, health care operations will cost less, which in return will increase return on investment (ROI). Therefore, from the view of health care as a commodity, when the price for health care drops, more patients will be able to attain health services, and the population health status will increase.

Years have passed since the IOM reports showed that communication is a major contributor to medical errors. However, the impact of these reports on medical error occurrence proba-
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