ABSTRACT
With the rapid emergence of health information technologies (HIT) in hospitals, it is important to understand how the design of these systems affects the communication of patient information and the collaboration of hospital teams. HIT systems can provide benefits to the patient-care process [2,4,5], but they do not always address serious information problems. In some cases, the design and use of HIT systems can cause additional information problems [2,4]. Therefore, this qualitative study seeks to understand how hospital teams identify and manage these information problems, and how information problems impact the collaborative activities of the hospital team.

Categories and Subject Descriptors
H.5.3. Group and organization interfaces: Computer supported cooperative work; J.3. Life and medical sciences: Medical information systems.

General Terms
Design, Human Factors.

Keywords
Health information technology; information problems; computer-supported cooperative work; collaboration; system design.

1. INTRODUCTION
Hospitals are highly collaborative, information-rich environments where hospital staff rely on the availability, accuracy, and completeness of information in order to make well-informed decisions about patient care. However, hospital staff frequently encounter information problems. These information problems include wrong, outdated, conflicting, incomplete, or missing information that may interfere with the ability of the hospital staff to do their work. Although these information problems have existed for some time in paper-based patient records [2], there is an increasing need to focus on information problems in electronic records. This is because of the tremendous growth of health information technologies (HIT) in U.S. hospitals due to recent government incentives [8]. Researchers describe how HIT can provide various benefits to users [2,4,5]. However, the use of HIT also changes how hospital teams document, share, and retrieve patient information [2]. In some cases, the design and use of HIT systems can actually introduce new information problems [2,4]. If these information problems are not appropriately identified and managed, they can pose a risk to the patient-care process and to the patients themselves [2].

Although researchers have identified some of the information issues associated with HIT [1,2,4-7,9], this research is still limited because it focuses on the individual users of the system and does not always consider the collaborative nature of hospital teams. Therefore, my study seeks to address this limitation by describing how the identification and management of information problems affects the collaborative work of the hospital teams. This research is relevant to the GROUP community because it can improve the understanding of how collaboration and system design impact the identification and management of information problems. This can then help to inform the design and use of HIT systems within hospitals.

2. BACKGROUND
Current research primarily focuses on the causes of information problems. Researchers discuss the challenge of designing HIT for the information-rich and fast-paced environment of hospitals. Studies show that HIT systems tend to be overly structured with rigid rules that encourage data standardization, which can result in information problems caused by the HIT design [2]. Information fragmentation is one HIT design issue that leaves the user with incomplete patient information and the loss of a cohesive overview of the patient’s record [2,5]. Current HIT system design has also led to a variety of data entry issues including difficulty entering non-standard data, unintentional selection of default values, and data truncation [1,5]. Additionally, ineffective HIT design can also prevent the entry of important descriptive information by forcing the use of standardized drop-down values [1] and result in the loss of psycho-social information that is said to provide, “continuity of patient care...[and] a richer picture of the patient’s situation” [9:2065].

Additionally, information problems are also caused by the users themselves. For instance, users tend to copy-and-paste information from prior notes. This can lead to outdated or incorrect information being carried throughout the system [4] and it can result in “reducing the credibility of the recorded findings, clouding clinical thinking, limiting proper coding, and robbing
the chart of its narrative flow and function” [7:495]. Delayed
information entry can also result when clinicians are too busy or
tightly scheduled to enter patient data into the HIT directly after
seeing a patient, which can cause information in the system to be
outdated or incomplete for extended periods of time [6]. This
negatively affects other team members who need access to up-to-
date, accurate records [2]. Therefore, this study seeks to extend
this research by, not only identifying how information problems
are identified and managed by hospital teams, but also
understanding the impact that information problems have on the
collaborative work of hospital teams.

3. RESEARCH QUESTIONS
The three main research questions of this study are:

RQ1: How do collaborative hospital teams identify information
problems?
• How does technology help or hinder the identification of
  information problems?
• How do work practices help or hinder the identification of
  information problems?
RQ2: How do collaborative hospital teams manage information
problems?
• How does technology help or hinder the management of
  information problems?
• How do work practices help or hinder the management of
  information problems?
RQ3: How does collaboration within hospital teams play a role
in identifying and managing information issues?
• How do hospital teams make each other aware of
  information issues?
• How do hospital teams determine accountability for
  managing or fixing the information issues?

4. RESEARCH METHODOLOGY
This study will use qualitative methods, including direct
observations and semi-structured interviews. This methodological
approach is appropriate for this study because qualitative research
can provide rich, detailed descriptions of the participants’
behaviors and perceptions, and other HIT researchers have used it
for this similar purpose [2,6,9]. The field study will be conducted
in the in-patient area of a large teaching hospital in northeastern
United States. I will shadow members of a hospital team (e.g.,
physicians, residents, nurses, social workers, care coordinators)
and take field notes on their communication activities (e.g.,
spoken discussions, formal paper or electronic documentation,
informal transitional documentation). In addition, I will observe
activities that involve the collaborative review of patient records,
such as hand-off and discharge planning discussions. The field
notes will be transcribed and reviewed in a continuous, systematic
way in order to ensure that I am capturing rich, descriptive data
that address the study’s research questions. The observations will
provide an understanding of the general workflow and local
terminology, and provide specific examples of information
problems that arise for the participants. The observations will also
help to inform the interview protocol.

After I have gained a sufficient understanding of the workflow
and information problems, I will conduct semi-structured
 interviews with the participants. The interview protocol will
provide an opportunity to gather the participants’ perceptions of
information problems, how HIT helps or hinders their ability to
manage information problems, and how information problems
impact their collaborative work activities. The interviews will be
audio-recorded, and then transcribed for data analysis purposes.
The data will then be analyzed using Braun & Clarke’s six-phase
thematic analysis approach [3]. This approach facilitates the
process of becoming familiar with the data, systematically
identifying codes and themes, and defining the common themes
found across the data.

5. PRELIMINARY FINDINGS
I conducted a 3-month preliminary field study to understand
hospital staff’s collaboration and use of HIT in an emergency
department. Findings from this preliminary study showed that
information problems frequently occur in hospitals. The various
types of information problems identified by the participants
included wrong, outdated, conflicting, incomplete, or missing
information in the HIT, which are similar to information issues
summarized in prior literature [1,2,4-7,9]. The study also
identified issues encountered when trying to manage the
information problems within a collaborative healthcare team
where multiple people are responsible for co-managing the
information. Some participants described their lack of editing
rights when trying to fix information issues, as well as the
conflicting and ambiguous perceptions of who is responsible for
fixing the problems. For example, a social worker recalled a time
when trying to fix inaccurate patient information in the system:
“Since I cannot update it as a social worker, I try to call others to
update it. But they sometimes say that it’s someone else’s
responsibility. I talk to registration, but they say that it’s the
nurse’s responsibility, but when I talk to the nurse, they say it’s
not their responsibility.” When asked if there was an unclear
understanding of responsibility for this situation, the participant
responded: “Well, it’s clear to them that it’s not their
responsibility [laughs]! But it’s not clear whose responsibility it
is.” The findings also describe how managing information
problems can lead to user frustration, workflow disruptions, and
the use of workarounds.

Therefore, the research study summarized in this paper seeks to
extend these preliminary findings in order to better understand the
information problems that hospital teams face. In addition, this
study also plans to explore the role that collaboration plays in
identifying and managing these information problems. This
includes addressing accountability issues, such as those described
by the social worker in the preliminary data.

6. CURRENT STATUS AND NEXT STEPS
I passed my dissertation proposal in January 2014 and will collect
my field study data from May through September 2014. I will
then analyze data and perform any follow-up data collection
during Fall 2014 and Spring 2015. I anticipate defending my
dissertation in Summer 2015.

7. EXPECTED CONTRIBUTIONS
This research will provide a better understanding of how
information problems are identified and managed by hospital
teams, as well as how information problems impact the
collaborative activities of the team. It will also offer socio-
technical design implications for how HIT systems can be more
effectively designed to help collaborative teams identify and manage these information problems. This work is supported by the U.S. National Science Foundation under grant IIS-1017247.

8. REFERENCES


