Modeling daily rounds to support efficient task management in ICU workflow

Preethi Srinivas, PhDc and Anthony Faiola, PhD†
1Indiana University School of Informatics & Computing, IUPUI

Introduction

Of all the duties performed by the critical care team in the ICU, the primary duty is the morning bedside rounds at patient bedside or within the corridors between the patient rooms. During/following the presentation, the attending physician leads the team into active collaborative information seeking (CIS) and sense-making mode, where team members attempt to achieve a common ground of understanding. Following the exchange, tasks for the next 24 hours are created and the critical care team members collaborate and coordinate in completing the tasks. These tasks may include orders (such as completion of lab tests or administration of medicines), collection and summarization of patient physiological measures, follow-up on the decisions that were made within a 24 hr period and so on.

Problem Space

Previous studies have identified the usage of paper-based task generation that is later transformed to a digital variant. There are, however, several drawbacks in this workflow model. For example, Figure 2 depicts a common workflow model where ICU bedside rounds management is executed during a two-day period. As several studies have outlined, in this common clinical scenario, there is often a lack of awareness, notification or updates on a common understanding of patient’s condition with completion of tasks and their corresponding goals. Furthermore, there is a lack of clear and concise communication of all the goals and tasks between team members. This may lead to a breakdown in collaboration and coordination between the team members in administering patient care.

To overcome these drawbacks in achieving the collective goal of administering patient care, critical care team members can collaborate through task management and receive notifications or alerts that require their attention at appropriate times. We believe that the process of effective and efficient management of tasks through its life cycle can serve as the foundation for efficient workflow in the ICU. Although Pryss and colleagues modeled task creation and management for a mobile device, their model lacked a notification system for all the team-members. In attempting to model task management in ICU clinical workflow, we propose adopting IBM’s architectural state diagram that will support for a task management system that is visible for all team members. The proposed model is envisioned to notify or alert based on the context without being disruptive. The system will be modeled such that the clinician will be able to identify the significance and decide whether and when to shift attention.

Figure 1. Figure depicting ICU bedside round with person-to-person and person-to-HIT communication. A group of critical care team members gather at a patient’s bedside (or outside the room in hallway) to understand and discuss the current condition of the patient as presented by the resident on duty.

Figure 2. Workflow over a two-day period

![Figure 1](http://publib.boulder.ibm.com/infocenter/dmndhelp/v6r1mx/index.jsp?topic=/com.ibm.websphere.bpc.610.doc/doc/bpc/ctasklifecycle.html)
pending-task in progress and put on hold, complete-task completed) and status (ready, assigned, terminated, expired, forwarded, failed or finished). Changes in the state and/or status of a task lead to the creation of notifications and/or alerts that are sent to team members.

Ongoing Work and Broader Impact

This ongoing research has two main goals: (1) Ascertain existing knowledge on clinical workflow with respect to communication and task management through collaborative information seeking (CIS) during daily bedside rounds. Ethnographic and experience sampling studies will be conducted to achieve this goal. (2) Introduce and evaluate a novel tool for mediating communication involving collaborative task management to support efficient workflow within the ICU environment. Results from goal 1 will help identify the underlying factors involved in communication and collaboration between the critical care team members while decision-making, goal-setting, and accomplishments of goals in patient care as a part of everyday rounds in the ICU environment. These will be used to iteratively design, develop and evaluate a task management tool. There is lack of adequate research with respect to task management post the daily ICU rounds on identifying the appropriate time and type of notification or alert (visual or auditory or tactile) to be sent to the clinicians. Notifications or alerts can be an interruption to an ongoing task for a clinician. Hence, it is imperative to understand both the timing and nature of interrupting notifications and its impact on the clinician’s attention and the overall ICU workflow. Hence, in addition to modeling and developing a task management tool, this research will also study the timing and nature of notifications or alerts sent to the critical care team members.

The ICU is an intensely complicated environment that challenges the ICU practitioners to perceive, understand, and diagnose patient condition from several independent pieces of information from multiple sources and collaborate as a team in administering safe, efficient, and effective patient care on a daily basis. Previous studies suggest nearly 91% of all medical mishaps are due to communication breakdown and inefficient team collaboration. Further, frequent hand-off of patient information and care responsibilities between team members requires effective and efficient communication and collaboration. The goal of this research lies in the introduction of a system that will support efficient workflow within the ICU environment by allowing critical care team members to create and manage tasks while mediating communication.

References


ii An alert is an action that moves a task from one state/status to another, while a notification can be the result of change in the state/status of the task or its subtasks.