Tips for Successful Implementation of Patient Safety Technology at the Bedside

Bedside patient safety solutions are proliferating as organizations strive to improve the safety of care delivery. While these technologies hold promise for reducing harm to patients, they also place additional devices in increasingly crowded bed spaces and increase the density of information that bedside caregivers must manage. Using the examples of hand hygiene monitoring and fall prevention systems, we offer some guidance to help your organization implement these systems so they effectively improve patient safety.

The Challenge

Hospital-acquired infections (HAIs) and patient falls are two of the major categories of accidental injury suffered by hospital patients. In recent years a number of vendors have marketed technologies to track, encourage, and document adherence to bedside hand hygiene standards, and to detect and prevent impending falls.

These systems come with a variety of monitors, sensors, and alarming devices located around the patient’s bed space, and they are not alone. They join nurse call systems, telemetry monitors, IV pumps, code alarm buttons, and patient entertainment consoles; in the ICU, add ventilators, pacemakers, hemodynamic monitoring, and more. All of these devices produce audible and visual alarms, and many of them interface with the EMR.

If these bedside patient safety solutions are to enhance safety in practice, they must be thoughtfully integrated into this already complex environment. Specifically, they must fit into your organization’s:

- Clinical environment and workflow;
- Information technology infrastructure; and
- Clinician communication strategy.

Workflow Challenges:

Detection Methods Differ

A variety of IT-enabled hand hygiene systems are sold that consist of some combination of badges worn by staff, room- or bed space-specific wall- or ceiling-mounted sensors, and in some cases, cleanser dispenser switches or monitors. A server and central database support the system, and a display or workstation is used to manage the system at the care unit level.

The systems detect compliance with hand hygiene by one of two different methods: sensing the dispensing of soap or alcohol cleanser in proximity to a specific caregiver; or aerosol detection of cleanser on the caregiver’s hands using a chemical detector. One workflow implication is immediately apparent: if your organization encourages use of pocket or lanyard-attached personal alcohol dispensers, systems that detect compliance based on wall-mounted dispensers will not work.

Another important element in considering hand hygiene systems is the accuracy of the mechanism for patient and provider localization. Some systems rely on a single sensor located above the entrance to the patient room to detect a staff member’s entrance into the room and exit, and do not provide spatial discrimination of their location within the room. Such systems will only suffice for single bed rooms—a problem for many hospitals and most ICUs, which frequently have beds spaced in close proximity, separated only by curtains or moveable dividers. Other systems have sensors mounted at the head of the patient’s bed or use combinations of infrared
(IR), radio frequency identification (RFID), or wireless LAN to determine the provider’s position relative to the patient with greater accuracy.

Alarm fatigue has officially taken its place beside alert fatigue in the pantheon of technology-induced maladies. The Joint Commission has announced that it will pay special attention to the problem of alarm fatigue in the coming year. In this context, adding another alarm-emitting device to the mix should be considered with caution.

Different products offer different options for staff notification of an event, such as a potential impending patient fall. Fall prevention systems utilize pressure sensors embedded in a mattress cover. Some products interface with existing nurse call systems; while this has the advantage of limiting the variety of alarm signals a nurse will hear, it does not necessarily distinguish the potentially serious situation (impending fall) from the routine (patient calling to ask for assistance with the television).

Some vendors avoid emitting audible alarms by sending text alerts to dedicated nurse IP phones or other IP voice communication devices. These systems have several advantages, including targeting a specific caregiver if desired, thereby reducing the flood of alerts to which all are subjected and delivery of a specific message to the desired nurse (e.g., “Patient X experiencing impending fall”). However, this strategy requires the purchase and configuration of devices for every staff member providing care on a shift. Another downside could be the loss of support for the “whoever is nearest” approach to alarm management, if that is the preferred practice in a given setting.

All hand hygiene and fall prevention systems receive an Admissions, Discharge, and Transfer (ADT) feed from the Hospital Information System (HIS), permitting intake of patient identification, room number, and basic demographic data. Beyond this, integration with the EMR and its underlying infrastructure varies widely. Regarding infrastructure requirements, for example, some hand hygiene systems consist primarily of wireless components, while others require Ethernet connection of sensors at the head of every patient bed space. Some use combinations of sensor technologies (IR and RFID); some utilize the Zigbee wireless technology with its separate, self-configuring WLAN.

CIOs must determine how each option would fit into their network infrastructure strategy, and eventually, their vision for a Real Time Locating System (RTLS). Organizations that have started or are planning to implement some aspect of RTLS (e.g., asset tracking, refrigerator temperature monitoring) should view differently products from vendors of stand-alone systems compared with systems from vendors offering monitoring technologies as part of a comprehensive RTLS suite. The latter

offer the option to integrate a bedside safety monitoring system into enterprise-wide patient flow and enterprise awareness systems.

A related consideration is the degree to which each candidate system incorporates patient-specific data at the care interface and, conversely, is able to integrate device-generated data into the EMR. For example, a system capable of incorporating patient-specific data into a falls prevention system could manage alerting logic differently in patients with different fall risk factors. Likewise, diagnoses or microbiologic results could be used to configure a hand hygiene system to track provider-patient contact for a patient with a resistant organism (e.g., Methicillin-Resistant Staphylococcus Aureus), providing valuable information for infection control. A higher concentration of patient-specific data yields more effective decision support.

Today’s inpatient environment is characterized by an extraordinary concentration of electronic communication signals that clinicians are expected to manage—among providers, between providers and automated systems, and between providers and patients. Nurses, for example, must respond to audible alarms, receive orders and alerts via computer, and converse with myriad caregivers and patients. Young physicians routinely communicate patient care information via text messaging and increasingly consider pagers an outdated nuisance. Today’s CIO needs to be cognizant of, and attempt to manage, this complex web of communication according to a coherent philosophy in collaboration with clinician leaders.

Part of such a strategy is to emphasize simplification and standardization wherever possible. With this in mind, it might be sensible to funnel as much output as possible from bedside monitoring systems through a single information channel, such as an IP phone as mentioned above. Such an approach would provide a single point of communication for that caregiver for voice, text, and some alert data.

Fit with Your Clinician Communication Strategy

Action Items

• **CIOs or their designees should participate in the selection of bedside technologies.** Do not let clinicians make these decisions in the absence of thoughtful IT input, particularly as many CIOs are also responsible for telecommunications.

• **Develop a clinician communication strategy** with input from your director of nursing practice, your CMIO and / or CMO, representatives of ancillary services, and community physicians.

• **Take the time to understand the fundamental workflow issues,** working with the frontline clinicians involved. Workflow realities should influence your evolving infrastructure strategy.