Reliable Care for Patients at Risk of Hospital Acquired Pressure Ulcers

An innovative system helps ensure the completion of routine tasks to avoid adverse events.

Abstract

Despite effective methods for identifying risk and preventing hospital acquired pressure ulcers (HAPUs), pressure ulcers remain the most prevalent preventable hospital acquired condition. A major contributor to the continued prevalence of pressure ulcers is the typical acute care environment in which patient care activities are often interrupted by emergent situations, care coordination and communications with patients, family and staff. Attempts to use technology to transform the patient care environment to be more predictable and less interrupt driven have proven unsuccessful.

One technology solution for preventing HAPUs has combined a novel wireless sensor with software that facilitates the consistent and timely completion of routine preventive actions in spite of the interrupt driven care environment. This solution relieves caregivers the task of turning patients who have already turned themselves, communicates turn periods in a way that can be easily understood and accomplished when time is available, and ensures patient turns are not missed.

Introduction

Quality health care delivery has never been more achievable. Our knowledge of human physiology, diagnosing and treating disease is comprehensive. The armamentarium of diagnostic tools, therapeutic modalities and patient monitoring capabilities is considerable. So why do adverse and sentinel events continue to plague health care delivery?

The patient care environment itself often hinders executing best practices for health care delivery. The prevalence of pressure ulcers, in most cases an easily preventable adverse event, typifies the frequent challenges facing health care providers and their patients. Many routine patient care tasks are critical to patient safety and positive patient outcomes. Examples of such routine tasks include patient turns, which prevent pressure ulcers, medication administration that avoids multiple adverse events, and respiratory circuit flushing that avoids ventilator-acquired pneumonia. Increased mortality and morbidity often result from missed, incomplete or interrupted routine patient care tasks.

An estimated 2.5 million patients are treated for pressure ulcers in acute care facilities each year. The estimated cost of managing a single full-thickness pressure ulcer is as high as $70,000, and the total cost for treating pressure ulcers in the United States is estimated at $11 billion annually.[1]

According to CMS and the Centers for Disease Control (CDC), pressure ulcers are the most prevalent preventable hospital acquired condition. Yet one key to prevention of pressure ulcers is simplicity itself: turn and reposition at-risk patients at routine time frames to reduce pressure. The persistent challenge presented by pressure ulcers is a consequence of challenges inherent to patient care areas where patients are diagnosed and treated

Patient Care Environment

Factors contributing to make the patient care environment hazardous start with the unpredictable nature of patients and the struggle to both ensure routine tasks are completed and respond to unforeseen or difficult to anticipate occurrences. Unlike the orderly and predictable manufacture of widgets, patients can be anything but predictable. Patients often exhibit their own unique combination of symptoms, response to therapy, progress and setbacks on their path to discharge. This patient variability contributes to an interrupt driven patient care environment where tasks – often complex and high risk – are completed with difficulty, if at all.[2]

Effective pressure ulcer prevention is often compromised by emergent demands and frequent interruptions that can drive this critical but routine preventive activity to the bottom of a work list where it can remain uncompleted. Current best practice (identifying at-risk patients and turning them every two hours) has proven to be marginally effective and difficult to sustain because consistent implementation is difficult to achieve.

Efforts to ensure that patient turns and a myriad of other routine but important patient care activities are reliably completed have depended on poorly applied technology[3] or manual "best practice" efforts driven by management. Progress towards reducing the incidence of pressure ulcers has been inadequate. Likewise, efforts to eliminate the occurrence of pressure ulcers using technology to transform the clinical environment into something more predictable where routine tasks can be reliably completed has failed. While the causes, prevention and cures for pressure ulcers are known, what is needed is a technology solution that actually works in spite of the challenges presented by typical clinical environments.

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Technology Solution

Inspired by recent advances in wireless sensors, the founders of Leaf Healthcare sought a better, more effective application of technology to the patient care environment. This system was designed using a patient worn wireless sensor, a wireless mesh network, and server based application software. Patients at risk for pressure ulcers have a sensor-based accelerometer with a three-week battery life applied to the chest. The system monitors patient movement and position changes over time, and correlates those position changes with prescribed turn protocols necessary to prevent pressure ulcers.

The system notifies caregivers when patients need to be turned via conveniently located dashboard displays. The dashboard provides visual feedback so that caregivers can identify those patients that need to be turned.

Many patients occasionally turn themselves as a natural consequence of shifting position. The system tracks these self-turns and automatically updates the dashboard, thus relieving the need for a staff assisted turn of the patient for that period. Caregivers can quickly identify those patients whose turn time has expired, and those patients that can be turned early when workload allows.

In clinical practice, patients are scored for pressure ulcer risk upon admission. Sensors are applied to those patients meeting the hospital determined at risk threshold. A patient sensor is attached to at risk patients and patient context is established using the associated software. The patient appears on the dashboard along with their position and progress toward time to turn.

Comparisons With Conventional Notification Methods

The approach above differs from conventional notification methods found at the point of care. Point of care activities can be divided into routine "as activities allow" and interruptions resulting from emergent situations or interactions with patients, family or staff. Routine activities may be scheduled for completion at specified times or as part of a work list of activities to be completed in a shift. Interruptions regularly result in failures to successfully complete required routine tasks every shift.[4]

Activities in response to emergent situations should be done as soon as possible. Alarms, alerts and similar indicators are intended to interrupt routine "as activities allow" types of tasks in response to critical situations. By their nature, emergent situations cannot be scheduled, nor can their frequency be determined in advance.

Tasks undertaken "as time allows" are often routine tasks driven by work lists derived from electronic medical records (EMRs) and other systems. Examples include recording vital signs, medication administration, coordinating patient care, patient turns and more. Added to this mix of emergent and routine tasks are communications required for discharge planning, physician communications and patient education. Much of this communication occurs in real time, meaning that time must be taken from other activities.

A predominate method of notifying caregivers of emergent situations is the use of alerts and alarms generated by medical devices and communications devices. Conventional alerts and alarms annunciate at the onset of an alarm condition such as when an alarm parameter is exceeded. These alarms may be silenced at the device, or sometimes

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remotely, for a predetermined period of time. Typically alarm conditions must be eliminated to cancel or terminate an alarm. Alerts and alarms are intended to notify caregivers of emergent or unanticipated events.

Conventional work lists are intended to drive routine "as activities allow" tasks. Work lists may also be used to manage the completion of routine tasks within specific time frames, such as medication administration and patient turns, or to help assure routine tasks are simply completed by end of shift. With no active annunciation, work lists are poorly suited to ensure that unanticipated transient events do not result in incomplete routine tasks. Transient events can overwhelm caregivers, precluding caregivers from accomplishing routine tasks, and routine tasks interrupted by transient events may never be completed.

Activities such as turning patients to prevent pressure ulcers are time sensitive like emergent events, yet flexible similar to "as activities allow" events. Bed turns can be done early, on time, or perhaps occasionally even on a slightly delayed basis without reducing effectiveness. The Leaf Patient Monitor dashboard user interface provides an alternative to the conventional alert or alarm at one extreme and the generic work list at the other. By providing feedback on time remaining and past scheduled periodic turns, the dashboard helps caregivers better utilize their time and ensure important "as activities allow" events are reliably completed. Time sensitive routine tasks that are managed in this way also provide management information that can be used to adjust staffing levels and nurse to patient assignments, identify training needs and other activities to optimize the smooth operation of the patient care environment.

Conclusion

Certain adverse events, such as pressure ulcers, fall into this category of preventive activity that is easily overlooked or forgotten in today's busy interrupt-driven point of care environment. Years of education, awareness building and best practice development have done little to eliminate these preventable hospital acquired conditions. New technologies are available that can be applied in new and unique ways to better match a technical solution to the actual environment found at the point of care in acute care hospitals. In addition to the wireless sensor and wireless mesh network, the Leaf Patient Monitoring System dashboard user interface provides notification methods that match the clinical environment and workflow associated with pressure ulcer prevention.

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About Leaf Healthcare, Inc.
Leaf Healthcare creates wireless patient monitoring solutions for health care providers who are seeking more efficient and cost effective ways to improve patient safety and clinical outcomes.

Corporate Headquarters
5994 West Las Positas Boulevard, Suite 217
Pleasanton, CA 94588
Toll Free: 1-844-826-LEAF (5323) | www.LeafHealthcare.com