The Computerworld Honors Program

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Final Copy of Case Study

YEAR:
2012

STATUS:
Laureate

Organization:
Lucile Packard Children's Hospital at Stanford

Organization URL:
www.lpch.org

Project Name:
Patient Safety Dashboard Project at Lucile Packard Children's Hospital at Stanford

What social/humanitarian issue was the project designed to address? What specific metrics did you use to measure the project's success?

Despite widespread awareness that approximately 98,000 US patients die from preventable medical errors each year, patient safety remains a daunting problem in clinical environments. Compliance with evidence-based guidelines (e.g., to prevent catheter-associated bloodstream infection (CABSI) and ventilator-associated-pneumonia (VAP)) is mandated by multiple regulatory agencies. However, implementation and monitoring of these guidelines can be challenging especially in high-pressure patient-care environments such as a pediatric ICU. The problem is technically challenging for the following reasons: - Care is provided by a team of people, each focusing on a different aspect of the overall care, with different mechanisms for documentation and communication that are not easily accessible to all team members. As a result, important elements of clinical documentation necessary to determine whether safety guidelines are being met are scattered in a mix of structured and unstructured information in a variety of locations, even in institutions that have comprehensive EMRs. - The medical professionals providing, monitoring, and documenting care are constantly on the move taking care of complex patients, so information must be captured, integrated and presented in a way that can be consumed rapidly by these professionals. From a business perspective, medical complications such as VAP and CABSI add enormous cost and consume unnecessary capacity in the healthcare system. - The accountability for such costs is shifting to the provider, creating additional incentives to invest in technology to prevent such infections. Until now, however, such technical solutions were difficult to provide. They required an EMR, analytics to extract the right information reliably from a variety

of structured and unstructured fields, and a clever interface designed to work in a high-pressure clinical environment. Thus, there is a great need for a reliable, cost-effective solution that can be deployed rapidly on top of a commercial EMR.

Please describe the technologies used and how those technologies were deployed in an innovative way. Also, please include any technical or other challenges that were overcome for the successful implementation of the project.

A project team created a real-time patient safety dashboard at Lucile Packard Children's Hospital at Stanford (LPCH), providing a unit-wide overview as well as detailed safety indicators (such as risk for CABSI and VAP) for each patient. This dashboard is fully integrated with the hospital's EHR (currently Cerner Millennium 2007.19). The safety measures are coded using a combination of Cerner Command Language (CCL, a variant of SQL), JavaScript Object Notation (JSON) and HTML. The dashboard has two elements: a multi-patient overview, and a patient-centered drill-down dashboard. The multi-patient dashboard is a replacement for the traditional scribbled whiteboards on the unit; it provides a HIPAA-compliant overview of the unit, and is visible in public locations such as on the wall of the nursing station. The patient safety innovation is that this dashboard ensures that the entire care team can see in real time 24/7/365 which patients are at elevated risk or behind in their preventive care, drawing from information that would otherwise be buried in patient charts. The patient-centered drill-down contains the details, and is reviewed on staff-only screens during rounds as well as on demand, for example, when a nurse checks why the patient's VAP indicator just changed from green to yellow. Particularly challenging was the problem of turning high-level clinical guidelines (available from various regulatory agencies and from the clinical literature) into reliable classifiers that determine whether the guidelines were met, whether there was an elevated risk for the patient, or whether there was an immediate intervention required.

Please list the specific humanitarian benefits the project has yielded so far.

Our hypothesis was that access to a real-time patient safety dashboard, visible continuously on the unit with patient details accessed and discussed during Pediatric Intensive Care Unit (PICU) daily rounds, would improve adherence to CABSI and VAP prevention guidelines and improve communication among the medical staff. Pre-implementation data for nursing engagement and line necessity discussion during rounds was collected via weekly nursing audits for 6 months, and post-implementation data was collected via an unbiased auditor daily for 1 month and then monthly for a 1-week block for 3 months. We deployed the dashboard at LPCH, initially in the 2E PICU, in June 2011. Audit data after a 3-month implementation period (with an average daily PICU census of 13.2) showed that multidisciplinary discussion of line necessity during rounds increased from 54% of the time before dashboard implementation to 75% after implementation. Audit data demonstrated that information presented on the dashboard prompted a change in the patient's plan of care in 34% of patient encounters, i.e., for 4 or 5 patients each individual day. Changes included central venous catheter discontinuation, changing medication delivery route from intravenous to oral, decreased laboratory utilization, providing overdue care such as cap changes, adjusting sedation, and elevating head of bed. Review of the dashboard added 7,496 seconds (median 56 seconds) to each patient's rounds. In addition, we received significant anecdotal feedback that the dashboard is continuously changing care: staff do not like seeing anything but green lights for their patients, and parents are alerting the staff as soon as they see a yellow or red light.

Please provide the best example of how the project has benefited a specific individual, enterprise or organization. Feel free to include personal quotes from individuals who have directly benefited from the work.

We conclude that use of a real-time patient safety dashboard embedded in the electronic medical record increased compliance with important elements of CABSI and VAP prevention bundles and facilitated time-efficient interdisciplinary communication during PICU rounds. We realized that use of the patient safety dashboard prompted change in care in 1/3 of patient rounds by: decreasing lab frequency; transition of IV to oral medications; removing central lines; adjusting sedation; head-of-bed positioning to prevent pneumonia. Examples of evidence and impact can be seen in the following video:
http://www.youtube.com/watch?v=VVZPbhhclAM&feature=digest_refresh_tue.