2016 Davies Award Winner

Children’s Hospital of Orange County

Core Metric: Pediatric Early Warning System

Executive Brief

About

Since 1964, CHOC Children’s has been steadfastly committed to providing the highest quality medical care to children. Affiliated with the University of California, Irvine, their regional pediatric healthcare network includes a state-of-the-art, 279-bed main hospital facility in the City of Orange and a 54-bed hospital-within-a-hospital in Mission Viejo. CHOC Children’s also offers many primary and specialty care clinics in Orange County and beyond, more than 100 additional programs and services; residency programs in pediatrics, pharmacy and nursing; support for several fellowship programs, and four “institutes” in cardiovascular care, neurosciences, orthopedics and pediatric cancer. CHOC Children’s was recognized as a Stage 7 HIMSS Analytics Inpatient awardee in 2015.

Overview

Children’s Hospital of Orange County (CHOC Children’s) conducted a pilot giving nurses and other caregivers an objective and uniform way of assessing a patient and, if necessary, calling a rapid response team to the bedside. They deployed a rapid response program and developed a Pediatric Early Warning System (PEWS), an electronic physiologic assessment tool to standardize language and process of clinical deterioration observation in non-ICU areas. The system leveraged patient data from the electronic health record (EHR) to assess all children for risk of deterioration.

Initial implementation of the rapid response team (RRT) reduced the annual code rate from 0.8/1,000 to 0.3/1,000 patient days in the medical-surgical and neuroscience units. PEWS decreased the non-ICU code rate even further to approximately 0.1/1000 patient days. As a result, CHOC Children’s estimated that 369 children have avoided resuscitation, with potentially as many lives saved. To date, CHOC Children’s has achieved a maximum of 1,003 days without a non-ICU cardiac arrest. The initiative also reduced the number of critical transfers to the ICU from the medical-surgical unit, indicating the success of identifying potential codes earlier in the deterioration continuum. In addition, CHOC Children’s overall mortality rate declined by 29.3 percent during the interval, and is 31 percent lower than the severity-calculated expected mortality rate.

Situation

In 2008, after an internal data review, CHOC Children’s determined that more than 80 percent of patients in non-ICU areas who eventually coded had displayed identifiable signs of clinical deterioration up to eight hours prior to arrest. In response, they created a plan to drive early detection of deterioration, drive earlier intervention, and reduce non-ICU codes.

The PEWS team designed a table in the EHR to calculate a PEWS score for patients in non-ICU medical surgical and neuroscience units, using evidence-based risk factors and respiratory, cardiovascular and neuro-behavioral physiological measurements. They also developed algorithmic workflows, depending upon the assigned score. A nurse manually used the table to calculate a score and the EHR automatically used the score to provide the nurse with an appropriate step-by-step workflow. The PEWS score was also automatically communicated through the EHR to nursing station electronic whiteboards and remote access tools to enable the care team to provide more timely detection and interventions.

Over time, CHOC Children’s added criteria to the PEWS scoring grid, including criteria for hypertension, defined hypotension and weighting of tracheostomy tube presence. In addition, because CHOC Children’s transitioned to early detection and intervention, they changed related operational performance measures from code response to code prevention.

Results

- Reduced non-ICU codes from 0.8/1,000 to 0.1/1,000
- Avoided 369 total resuscitations avoided
- Decreased overall mortality rate declined by 29.3%
- Saved $18.45 mil in cost avoidance
Outcomes
RRTs reduced non-ICU codes from 0.8/1,000 to 0.31/1,000 patient days. PEWS further reduced the non-ICU code rate from 0.3/1,000 to 0.1/1,000 patient days, which has been sustained for eight years. In the eight years of PEWS, at least 111 resuscitations were avoided, with a total of 369 children resuscitations avoided, potentially saving as many lives.

Lessons Learned
CHOC Children’s shared these lessons learned.

❖ Don’t automate everything. Don’t overlook the importance of the person using the process. The PEWS design could have included an automated process for populating some scoring criteria, but early discussions turned the design team away from full automation. The pharmacists and ICU team, as well as the human factors science literature, warned that overuse of auto-populating data can reduce the mental ownership and data awareness of the user.

❖ Don’t cast aside extra efforts that might initially seem less important. The design team, in conjunction with leadership, took extra IT time and effort to create color “stop light” icons within all relevant end user displays. These familiar icons and colors intuitively indicate the patient’s PEWS status beyond the numeral alone. The associated visual awareness of individual and collective scores is a significant enhancement that all end users deem helpful.

❖ Spread is likely. The gratifying result of recognizing and preventing deterioration is easily understood and fundamental to healthcare teams. Even though PEWS is designed for non-ICU inpatients, the concept of appropriate assessment during triage decisions was noted by other areas, specifically the inter-facility transport team and patient placement of emergency department admissions.

❖ A new lexicon will develop. Without intent, a patient-specific phrase quickly developed during handoffs or other quick communications. “He’s a PEWS green 0,” or “be aware, she’s a PEWS yellow 3” became part of the clinical landscape. This enhancement to team knowledge, updates and handoff communications became part of the culture change.

❖ Power of situational awareness can’t be overstated. At the individual non-ICU patient level, PEWS scores are calculated and/or reviewed by the bedside nurse at least 10 times each day. Adding a unit charge nurse and nurse aides increases that number. Each time the chart is opened, the default screen includes the PEWS score/color icon in the upper left corner. The PEWS score is also a part of the banner bar across the top of each clinical EHR page. When providers are added, it’s likely that a patient’s PEWS score is viewed 50 - 100 times per day. The unit electronic whiteboard forms the backdrop of the nursing unit environment. The non-reassuring PEWS scores readily stand out and lead to exploration. We believe it’s this awareness that has led to sustained reduction in non-ICU codes.

Financial Considerations
Costs included $16,000 for equipment, $100,000 for software development and $25,000 for nursing education. Based on industry research and literature, CHOC Children’s estimated that 369 avoided resuscitations resulted in $18.45 million cost savings.

Since 1994, the HIMSS Nicholas E. Davies Award of Excellence has recognized outstanding achievement of organizations who have utilized health information technology to substantially improve patient outcomes while achieving return on investment. The Davies Awards program promotes EHR-enabled improvement in patient outcomes through sharing case studies and lessons learned on implementation strategies, workflow design, best practice adherence, and patient engagement.

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