What's New in the Patient Safety World

May 2018

Pediatric Early Warning System Fails

We've long attempted to develop early warning systems that identify patients at risk for deterioration at a time when intervention may avert disaster (see the list of our prior columns below). These systems have met with varying degrees of success.

Most studies on early warning systems have taken place in adult populations. We did discuss pediatric early warning systems in our September 17, 2013 Patient Safety Tip of the Week "First MEWS, Now PEWS". In that column we noted a study by Parshuram et al (Parshuram 2011a) that demonstrated implementation of a validated modified PEWS system (Parshuram 2011b) in a community hospital was associated with fewer late transfers to tertiary pediatric centers, fewer serious clinical deterioration events, and fewer stat calls to pediatricians. In addition, there was no change to pediatrician workload and staff noted decreased apprehension when calling the physician.

Parshuram and colleagues (Parshuram 2018) recently reported on use of the Bedside Pediatric Early Warning System (BedsidePEWS) in a multicenter cluster randomized trial of 21 hospitals located in 7 countries (Belgium, Canada, England, Ireland, Italy, New Zealand, and the Netherlands) that provided inpatient pediatric care for infants (gestational age ≥37 weeks) to teenagers (aged ≤18 years). The BedsidePEWS intervention was used at 10 hospitals and outcomes were compared with usual care (no severity of illness score) at 11 hospitals.

All-cause hospital mortality, the primary outcome, was 1.93 per 1000 patient discharges at hospitals with BedsidePEWS and 1.56 per 1000 patient discharges at hospitals with usual care (non-significant). Significant clinical deterioration events, a secondary outcome, occurred during 0.50 per 1000 patient-days at hospitals with BedsidePEWS vs 0.84 per 1000 patient-days at hospitals with usual care (P = .03). There was no significant difference in rates of cardiac arrest, potentially preventable cardiac arrest, unplanned ICU readmission, or hospital readmission. And for those with urgent ICU admission there were no differences in severity of illness at ICU admission, ventilator-free days, organ dysfunction, and resource use.

There was also no significant difference in calls for immediate physician review, immediate calls for the resuscitation team, or urgent ICU consultation.

The composite outcome measure of late ICU admission (significant clinical deterioration events) was the sole positive outcome in favor of the BedsidePEWS group but was not accompanied by significant differences in related outcomes.

The authors conclude that implementation of the Bedside Paediatric Early Warning System compared with usual care did not significantly decrease all-cause mortality among hospitalized pediatric patients and that use of this system to reduce mortality is not supported.

In the accompanying editorial (Halpern 2018), Halpern notes that the mortality rates were lower than expected in both groups and that perhaps mortality is not the most appropriate outcome parameter. He notes that the decrease in significant clinical deterioration events suggests fewer delays in ICU admissions. He suggests that "future studies should be designed to advance BedsidePEWS to the next level with informatics development as well as dynamic and time-based integration with other data elements in the electronic medical record".

We concur that we should not give up on the concept of the early warning system and should continue to look for ways to optimize recognition of patients at risk for deterioration before such deterioration occurs.

Some of our other columns on MEWS or recognition of clinical deterioration:

- February 26, 2008 "Nightmares: The Hospital at Night"
- April 2009 "Early Emergency Team Calls Reduce Serious Adverse Events"
- December 15, 2009 "The Weekend Effect"
- December 29, 2009 "Recognizing Deteriorating Patients"
- February 22, 2011 "Rethinking Alarms"
- March 15, 2011 "Early Warnings for Sepsis"
- October 18, 2011 "High Risk Surgical Patients"
- March 2012 "Value of an Expanded Early Warning System Score"
- September 11, 2012 "In Search of the Ideal Early Warning Score"
- May 2013 "Ireland First to Adopt National Early Warning Score"
- September 17, 2013 "First MEWS, Now PEWS"
- January 2014 "It MEOWS But Doesn't Purr"
- March 11, 2014 "We Miss the Graphic Flowchart!"
- July 15, 2014 "Barriers to Success of Early Warning Systems"
- November 11, 2014 "Early Detection of Clinical Deterioration"
- February 2015 "Detecting Clinical Deterioration: Don't Neglect Clinical Impression"
- April 28, 2015 "Failure to Escalate"
- September 8, 2015 "TREWScore for Early Recognition of Sepsis"
- October 2015 "Even Earlier Recognition of Severe Sepsis"
- December 15, 2015 "Vital Sign Monitoring at Night"
- June 2016 "An EMR-Based Early Warning Score"

Our other columns on rapid response teams:

- August 2007 "Responding to Patients with Clinical Deterioration"
- Novermber 27, 2007 "More on Rapid Response Teams"
- August 2008 "AHRQ's New Patient Safety Primers"
- December 2008 "Rapid Response Teams Don't Live Up to Expectations".
- April 2009 "Early Emergency Team Calls Reduce Serious Adverse Events"
- December 29, 2009 "Recognizing Deteriorating Patients".
- February 2010 "Rapid Response Teams Still Not Cutting It"
- November 11, 2014 "Early Detection of Clinical Deterioration"
- April 28, 2015 "Failure to Escalate"
- February 2017 "BOGO Applies to Adverse Events, Too"

References:

Parshuram CS, Bayliss A, Reimer J, et al. Implementing the Bedside Paediatric Early Warning System in a community hospital: A prospective observational study. Paediatr Child Health. 2011; 16(3): e18–e22.
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Parshuram CS, Duncan HP, Joffe AR, et al. Multicentre validation of the bedside paediatric early warning system score: a severity of illness score to detect evolving critical illness in hospitalised children. Crit Care 2011; 15(4): R184
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Parshuram CS, Dryden-Palmer K, Farrell C, et al. Effect of a Pediatric Early Warning System on All-Cause Mortality in Hospitalized Pediatric Patients. The EPOCH Randomized Clinical Trial. JAMA 2018; Published online February 27, 2018
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Halpern NA. Early Warning Systems for Hospitalized Pediatric Patients. JAMA 2018; Published online February 27, 2018
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