

What's New in the Patient Safety World

December 2021

Can AI Triage Postoperative Patients More Appropriately?

We've written many columns on postoperative complications and attempts to identify clinical deterioration early enough for clinical intervention to make a difference in patient outcomes. Various early warning systems (EWS's) have been devised, using both clinical and physiological data and data residing in the electronic medical record. Those EWS's are designed to identify patients who need to be moved to a higher level of care. But how about a system that more appropriately triages postop patients to that higher level of care?

Loftus et al. ([Loftus 2021](#)) have developed a developed a real-time machine-learning model to identify undertriage to hospital wards among patients after surgical procedures.

Their machine-learning algorithms analyze preoperative and intraoperative data and estimate patients' risk of postoperative complications. Data found to be important for these algorithms included primary procedure, scheduled postoperative location, intraoperative minimum alveolar anesthetic concentration measurements, and duration of inhalation anesthetic. These were the best predictors of mortality and prolonged ICU stay.

Patients identified by these algorithms as being at increased risk for postoperative complications who were undertriaged to hospital wards had increased mortality and morbidity compared with a risk-matched control group of admissions to ICUs.

The authors conclude that real-time machine-learning models are valuable in identifying postoperative undertriage.

In an accompanying commentary, Ko and Wren ([Ko 2021](#)) note that some early warning systems, like MEWS, when used for postoperative triage have been associated with a significantly decreased rate of ICU admissions without a difference in mortality rate, suggesting the tool's utility in preventing overtriage to the ICU. They suggest that, with more sophisticated machine-learning models like that developed by Loftus and associates, "one could anticipate not only avoiding undertriage to wards, which may be wrought with increased mortality and morbidity, but also preventing overtriage to the

ICU in the setting of increased health care costs and overuse of resources.” They do go on, however, to discuss the continued importance of clinical judgement, and conclude that data-driven, patient-level risk assessment models seem promising, not in substitution for clinical judgment, but in supplementation of it.

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](#)”
- May 2018 “[Pediatric Early Warning System Fails](#)”
- May 26, 2020 “[Early Warning Scores](#)”
- December 1, 2020 “[An Early Warning System and Response System That Work](#)”
- July 2021 “[EPIC Sepsis Prediction Tool Falls Short](#)”
- July 13, 2021 “[The Skinny on Rapid Response Teams](#)”

Our other columns on rapid response teams:

- August 2007 “[Responding to Patients with Clinical Deterioration](#)”
- November 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](#)”
- May 26, 2020 “[Early Warning Scores](#)”
- December 1, 2020 “[An Early Warning System and Response System That Work](#)”
- July 13, 2021 “[The Skinny on Rapid Response Teams](#)”

References:

Loftus TJ, Ruppert MM, Ozrazgat-Baslanti T, et al. Association of Postoperative Undertriage to Hospital Wards With Mortality and Morbidity. JAMA Netw Open 2021; 4(11): e2131669

<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2785924>

Ko A, Wren SM. Advances in Appropriate Postoperative Triage and the Role of Real-time Machine-Learning Models: The Goldilocks Dilemma. JAMA Netw Open 2021; 4(11): e2133843

<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2785926>

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