



Detect and Save: Predicting and Preventing Clinical Deterioration Using Artificial Intelligence



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Background

- Early identification of patient clinical deterioration holds the potential to improve outcomes; yet it remains a challenge in both inpatient and outpatient settings.
- Artificial intelligence (AI) predictive models show promise in this area, but there are few examples of successful implementations.

Objective

Our pilot study aims to evaluate an AI-driven care model for identifying and intervening on hospitalized patients at risk of clinical deterioration.

Analysis

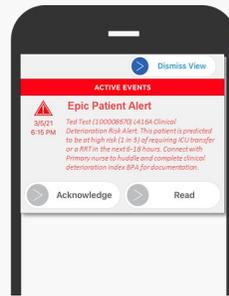
- Existing methods, relying largely on gestalt, consider only a subset of data available leading to inaccurate or late detection of deterioration.
- Signs of possible deterioration are often not acted in the absence of a shared mental model for detection and prevention.
- EPIC's clinical deterioration model precision and specificity maximized at 20% for predicting ICU transfers and RRTs in 6-18 hours when validated on Stanford's patient population.

Description of Intervention

1 Epic patient list view flag



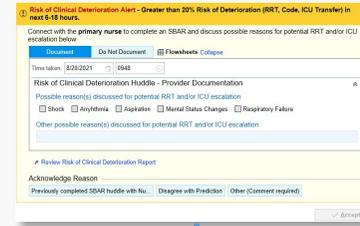
2 Cellphone alert to primary RN and MD



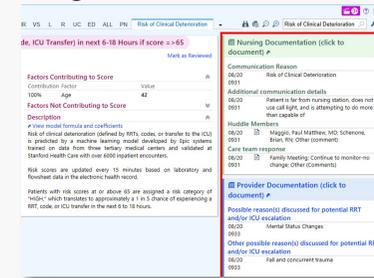
3 Multidisciplinary Clinical Deterioration Huddle following SBAR structure

- **S:** Patient at high risk of clinical deterioration
- **B/A:** Discuss nursing concerns (Primary Nurse) and likely reason(s) for clinical deterioration (Provider Team)
- **R:** Discuss response to risk of clinical deterioration
 - Assess aspiration risk
 - Transfer to high level of care
 - New orders
 - Goals of care discussion
 - Family meeting
 - New consult
 - ICU provider team consult
 - Critical care response nurse consult
 - Other (comment)

4 RN & MD documentation in Best Practice Alert

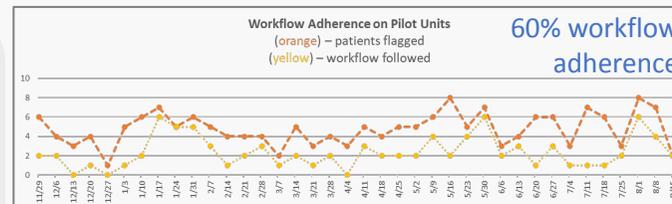


5 RN & MD documentation merged and visible to car team



Feedback and Near-Term Outcomes

- I feel the Clinical Deterioration Prediction is a valuable tool in caring for my patients on a scale of 1 to 10. **9.00**
- The workflow of the CDI, is one that I feel is value adding. **96.5%** Yes/Somewhat
- The Clinical Deterioration Index changes the way I care for my patients. **89.6%** Yes/Somewhat
- The Voalte Alarm is a helpful tool when caring for my patients. **96.5%** Yes/Somewhat
- Documenting is easy. **89%** Yes/Somewhat



Row Labels	Average ICU Escalations Per Week	% Change
Pre-Implementation	1.61	47% Reduction
Post-Implementation	0.86	0.0147 p-value

Row Labels	Average RRT Events per Week	% Change
Pre-Implementation	0.89	42% Reduction
Post-Implementation	0.51	0.0613 p-value

Row Labels	Average Code Events per Week	% Change
Pre-Implementation	0.17	66% Reduction
Post-Implementation	0.06	0.1018 p-value

Key Takeaways

- A multidisciplinary AI-enable care model for intervening on hospitalized patients at risk of clinical deterioration is feasible and acceptable to bedside nursing and providers.
- Early results indicate patient outcomes are improved as well.
- Involving end-users in qualitative model validation increases trust in model predictions and buy-in.
- Communicating model performance in laymen's terms was key in care model design.
- Leveraging a quality improvement frameworks and involving IT/Informatics and Nursing Practice advisors throughout the project ensures sustainable and scalable workflow design.

Next Steps

- Expand pilot to all Hospital Medicine and General Surgery inpatient units
- Conduct qualitative and quantitative evaluation across all inpatient pilot units

QR Code for more detailed outline of workflow!

