Case study

DukeHealth

Piloting the Sepsis Watch in a silent trial

About

This case study examines the implementation of a silent trial for Sepsis Watch, a deep learning sepsis detection and management platform developed at Duke University Hospital (DUH). The **silent trial period** allowed for real-world evaluation of the model and workflow, enabling the team to identify and address potential issues before impacting patient care.

The problem

DUH sought to improve early detection and management of sepsis in adult patients presenting to the Emergency Department (ED). Prior attempts to implement Clinical Decision Support (CDS) systems had led to significant alarm fatigue and no improvement in clinical outcomes. The team wanted to leverage machine learning to predict sepsis and coordinate care to ensure timely completion of recommended treatment bundles.

The solution

An interdisciplinary team of clinicians, data scientists, and IT leaders developed **Sepsis Watch**, a deep learning sepsis detection and management platform. It was designed as an overlay on existing clinical care in the ED, with all diagnostic and treatment actions executed by ED staff, rather than a specialized sepsis response team.

The approach

A 3-month silent period was implemented before the official launch of Sepsis Watch. During this period, the system interacted with real-time data, allowing for:

- A final round of data mapping and clinical validation to reconcile changes in data formatting.
- End-to-end testing of the model, data pipeline, user interface, and workflow.
- Threshold setting to optimize positive predictive value and alert volume, limiting to 4 high-risk alerts per hour for a single RRT nurse.
- Clinical leaders reviewed 50 high-risk cases with a 72-hour delay to validate the threshold and could contact inpatient teams if immediate action was needed.

The success

- ✔ **Alert Volume**: The silent trial showed an average of 14 patients meeting sepsis criteria and 7 flagged as high-risk daily, aligning with expectations and preventing user overload.
- ✔ **Workflow Adjustments**: Feedback prompted workflow changes, including direct communication between the RRT nurse and primary ED bedside nurse for efficient sepsis treatment completion.
- ✔ **Model Refinement:** The silent trial allowed for addressing potential data drift and bias before full implementation.

Although there is no playbook for integrating deep learning into clinical care, learnings from the Sepsis Watch integration can inform efforts to develop machine learning technologies at other health care delivery systems.