

HIMSS IN ACTION

DUKE HEALTH

Location
North Carolina,
United States

Transformation Type
Predictive Analytics
& Clinical Workflows

Maturity Model
Electronic Medical Record
Adoption Model (EMRAM)



HIMSS®

EMRAM STAGE 7

SQUEAKY CLEAN DATA STRATEGY THAT PREVENTS SEPSIS.

Our EMRAM model helped Duke Health fine-tune their EHR workflows and cut sepsis rates right down with predictive analytics.

Let's dive into the details.

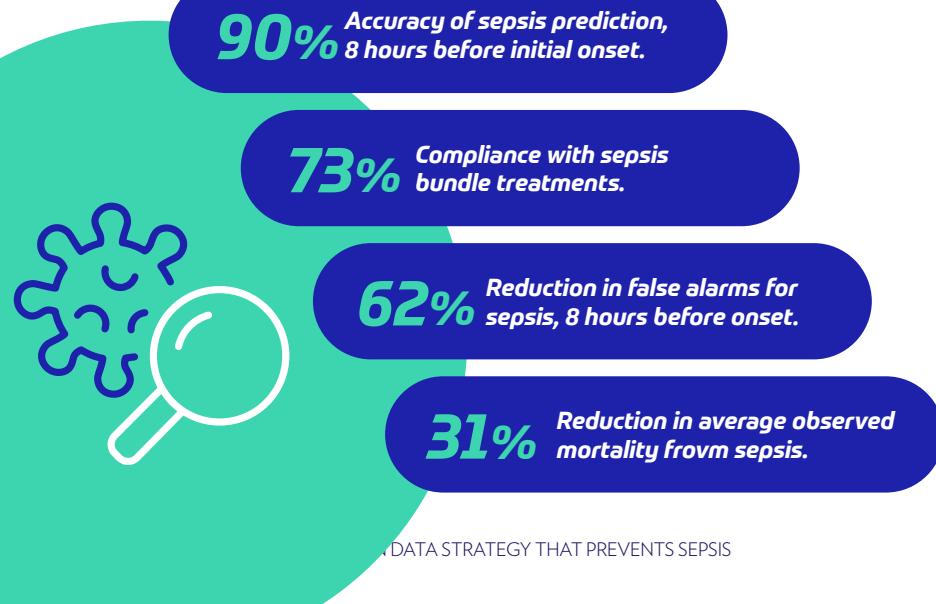




STATSHOT + OVERVIEW

Duke Health is using predictive analytics to fight sepsis.

They've been digital health pioneers for decades—since the 1960s, in fact. During the Flower Power years, they adopted one of the world's first EHRs, which was not-so-creatively named The Medical Record. Over decades, that original system evolved into 135 mini-EHRs, which was... a lot. So in 2011, they started the push to condense all those subsystems into one EHR solution: Epic. Duke began using our EMRAM model to guide their transformation in 2014, and climbed all the way up to Stage 7 by 2017.



By the early 2020s, our EMRAM standards had helped Duke build one unified EHR and standardize their clinical workflows. But providers were still suffering from alarm fatigue, especially around sepsis. Duke's workflows for sepsis screening didn't incorporate individual patient data yet, which meant Epic triggered tons of false alerts. 63% of Best Practice Advisories (BPAs) were false, and Epic was sounding 447 BPAs per day. Providers were running ragged, and missing chances to intervene in true cases.

Our newest EMRAM Stage 7 framework guided Duke in deploying the Sepsis Watch predictive analytics model, powered by machine learning inside Epic. Sepsis Watch's parameters can be adjusted and personalized to each patient, so alert notifications fire only when actually needed. Fewer patients are dying from sepsis, Duke's clinical staff has got more breathing room, and their whole system is saving millions through reduced lengths of stay.

That's digital health transformation in action.

⚠ THE PROBLEM

Every hour counts with sepsis, and EHRs need to guide providers to the right patients fast.

Sepsis is difficult to identify early, and even more difficult to treat once septic shock occurs. There's no clear onset and no reliable biomarkers, and the mortality rates run between 40% and 50%. It's scary. EHRs that help with early screening are literal life-savers, because the risk of death increases 7.6% every hour that treatment is delayed. And before Duke's latest EMRAM validation, they had a two-pronged problem: false alerts which wasted time, and an error-prone manual risk identification process.

The National Early Warning Score (NEWS) model that Duke used within Epic fired BPAs 447 times per day, with an average of 42 unique daily patients. Some individual patients would trigger over 100 alerts per day, and in many cases, these were just ultra-fit athletes with low resting blood pressure rates. Duke was seeing over 5.5 false alerts per true alert, and only 6.8% of patients flagged by the NEWS model had actual sepsis. Our EMRAM strategists saw the impacts during our regular check-ins: Duke providers were wasting time and energy on safe, healthy patients.

Treatment workflows for sepsis weren't standardized, either. Duke's SEP-1 treatment bundle included lactate, blood cultures, antibiotics, and IV fluids, and a later round of vasopressors as appropriate. The SEP-1 panel is effective at staving off septic shock... but clinical compliance was as low as 30% and 31% at two of Duke's sites. Strategy sessions around their EMRAM revalidation revealed that their system-wide SEP-1 compliance rate was 51%, well behind the national average of 57%. Duke knew they had to catch up.

Guided by EMRAM, they spotted process issues and started tracking the metrics that mattered most.



 **SOLUTIONS**

EMRAM helped Duke create a framework for rolling out Sepsis Watch and measuring its impact.

Every system that reaches EMRAM Stage 7 has to have EHR systems that support dynamic patient management. That means using each individual patient's data to define their 'normal'—so the sporty ones don't trigger an avalanche of false sepsis alerts. Looking to smash their EMRAM revalidation, Duke built a Sepsis Watch machine learning model on top of Epic and rolled it out everywhere.

The Duke team's approach to predictive analytics was meticulous. They trained Sepsis Watch on a 32 million-point dataset built from 42,000+ inpatient encounters, 21.3% of which included a sepsis event. The parameters included 34 core physiological variables, 35 covariates like age and transfer status, and 10+ drug classes that can affect 'normal' vital signs. Sepsis Watch's simple interface turned those complex inputs into actionable outputs: color-coded 'cards' that let providers assess who's at risk for sepsis at a glance.

No more "BEEP BEEP, IT'S SEPSIS"—providers started getting simple guidance, tailored to each patient.

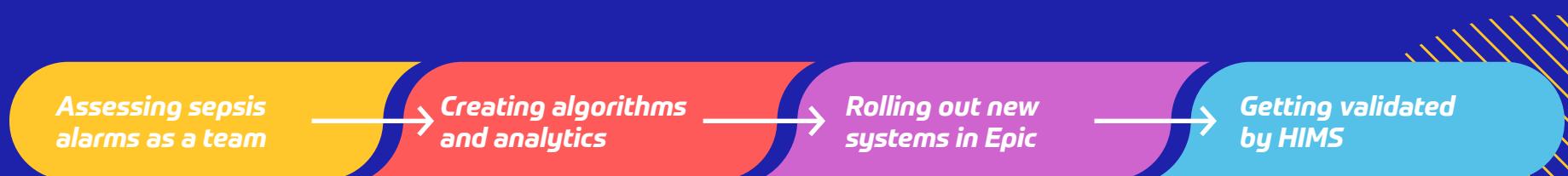
 CHANGE MANAGEMENT

EMRAM guided their rollout strategy, and helped win stakeholder buy-in from start to finish.

Predictive models are only as good as the data they're fed. Integrating data from multiple sources is required for EMRAM Stage 7, but Sepsis Watch wouldn't work if collecting those 70+ variables was a time burden. Duke got input on the diagnostic workflow from a number of working groups, including data scientists, providers, informaticists, and operations leaders. They (wisely!) decided to build Sepsis Watch right into Epic to avoid confusion on the floor. Care continued as usual, with the simple add-on of streamlined data collection.

Backed by accurate multivariable data, the Sepsis Watch model gave clinicians time to confirm the AI-powered diagnosis and respond with the right SEP-1 bundle. Duke also designated a team of rapid response nurses as the recipients of Sepsis Watch cards, so the cognitive load was carried by a focused few. During regular EMRAM check-ins, we watched screening accuracy rise, SEP-1 compliance soar, and alert fatigue drop right down.

Our model guided Duke's innovation culture and built predictive analytics into existing workflows.





Sepsis Watch made a massive impact on patient outcomes.

Let's give all our credit where it's due: to revalidate at EMRAM Stage 7, Duke built and rolled out the world's first machine learning model for sepsis screening. Sepsis Watch screens for sepsis with 93% accuracy at 8 hours before full onset, and the ratio of false alarms to real alarms dropped by 62% in that same timeframe. Deaths from sepsis are down, too: the observed mortality rates across Duke's three sites dropped by 31%, from 8% to 5.5%.

SEP-1 compliance rates didn't just catch up—every site leapfrogged way past the national average. Duke University Hospital jumped up from 31% to 68% compliance, while Duke Regional Hospital rose from 49% to a whopping 73% compliance. Data capture and sepsis screening workflows are simple and used system-wide, and Sepsis Watch assesses patients' risk levels every 15 minutes. The wins they've achieved working with EMRAM show how careful integration of AI can make patient care safer... and that much more efficient.

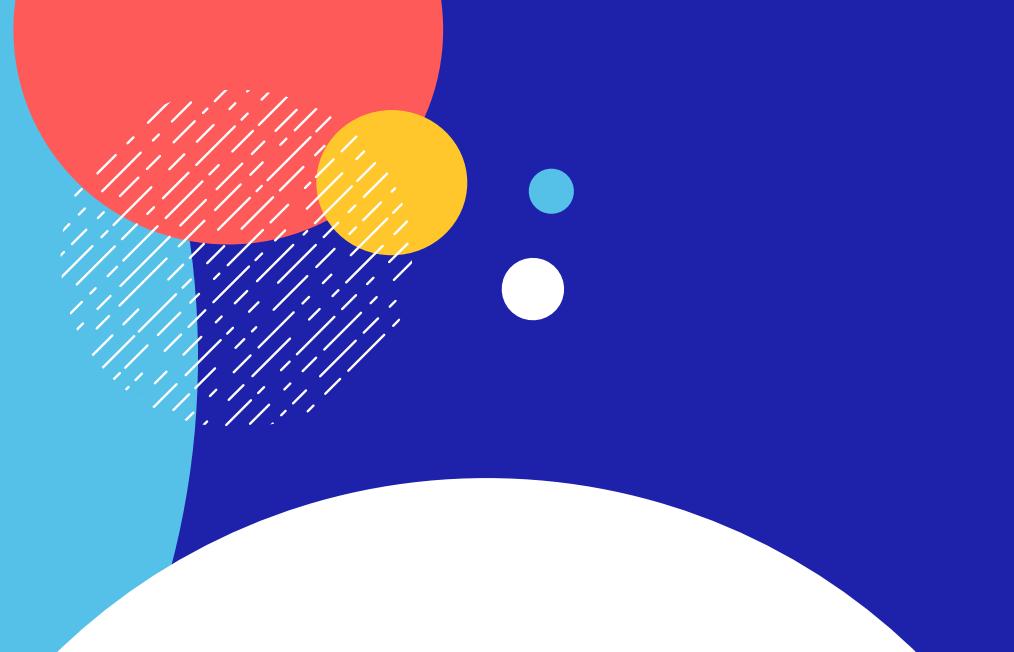
Now, Duke is fighting sepsis and clinician burnout with predictive analytics (and winning).

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Duke's deployment of a data-driven Sepsis Watch program shows they can evolve their workflows and remain at the forefront of innovation.

CHRISTINA GRIMES RN, MSN, MBA | Digital Health Strategist | HIMSS



ABOUT EMRAM / ABOUT HIMSS

EMRAM is our flagship maturity model.

This maturity model drives medical technology adoption, boosts patient engagement and supports the clinical use of EMR tools. With our team backing you up, you'll strengthen your clinical care and health outcomes across every patient population.

All our experts are ready when you are.

EMRAM *Capabilities*

-  **Digital health transformation**
-  **Simplifying clinical workflows**
-  **Better patient outcomes with EHR integrated predictive analytics**
-  **Earning clinician buy-in**
-  **Boosting patient engagement**

 EMRAM RESULTS

You're in good company, friends.

Here's how EMRAM helped other systems transform:



\$752,000 reduction in costs treating bacterial (MRSA) infections for AdventHealth.



15% increase in discharges for stroke patients at Mount Sinai St Luke's.



\$3 million in savings on antimicrobial therapy for Stanford Children's Hospital.

Make your digital health transformation happen.

Reach out to speak to our team anytime at mputich@himss.org. (We're here!)