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CASE STUDY · MARLUC SYNOPSIS

Epic Sepsis Model

IMPLEMENTED 2018–2026 · HEALTH AND LIFE SCIENCES · US · BAND E · PARTLY PROVED

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A sepsis prediction model built into a widely used hospital records system. An independent 2021 study at Michigan Medicine found poor performance; Epic disputed the method, later revised the model, and a 2026 study found better discrimination but low precision.

ABOUT THIS SYNOPSIS

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NOTICE WORDING LAST UPDATED 16 NOVEMBER 2026

AT A GLANCE

No measurable effect: tested, no effect.

AI and automation used: Proprietary sepsis prediction model scoring hospital inpatients every 15 minutes inside the electronic health record; the original is described in one study as a penalised logistic regression.

Implemented: 2018–2026. Grade: band E, No measurable effect, Partly proved.

Headline result, as reported: Michigan Medicine study found the model missed 67% of sepsis cases and alerted on 18% of hospitalisations, 2021

1 · The case

The facts, as reported by the 6 sources listed at the end. Where a source is silent, the field says "Not reported".

Organisation

Epic Systems. Epic Systems is a US electronic health record vendor. Its sepsis model runs inside the Epic record at hospitals; the 2021 study covered Michigan Medicine, the academic health system of the University of Michigan. Size of Epic: Not reported in the sources used. Canvas block: 4. Operations and process. Also 6. Data and technology, 8. Governance and risk.

Business challenge

The challenge. Sepsis is a life-threatening reaction to an infection and a leading cause of hospital deaths in the US, per MedCity News. Hospitals adopted prediction tools to flag it early, and the 2021 study authors said the model's ability to identify sepsis had not been adequately evaluated despite widespread use.

How it was addressed. Epic's sepsis model calculates a risk score from vital signs, laboratory values and other record data every 15 minutes, and hospitals choose the score that triggers an alert, per MedCity News. The study authors describe it as implemented at hundreds of US hospitals. Epic said the Michigan study did not take into account the analysis and fine tuning needed before real-world deployment, that its formula and inputs are available to administrators, and pointed to a University of Colorado Health preprint that found the model more accurate than that site's early warning score. [1] [2] [3] [4] [5] [6]

Who implemented it

Epic Systems (Software vendor): Developed and supplied the sepsis model within its electronic health record.
In-house (In-house): Individual hospitals: Chose the alert threshold and deployed the model locally.

Technology (SEAM pillar E)

SEAM types: T8 Predictive / ML models, T2 Embedded AI in existing software. Deployment: Vendor SaaS. Vendors and products: Epic Systems, Epic Sepsis Model, Epic Sepsis Model version 2.

Where it was built in: Built into the Epic electronic health record; scores are generated every 15 minutes and raise alerts for clinicians at a threshold each hospital sets.

What changed

Before: a risk score alerting clinicians at a threshold each hospital set. After the 2021 study: Epic revised the model, per STAT, recommending training on a hospital's own data and changing its definition of sepsis onset, and a 2026 study tested the updated model at four health systems. [1] [2] [3] [4] [5] [6]

What it cost

Not reported

What it saved

Not reported [1] [2] [3] [4] [5] [6]

Governance and control

The 2021 authors said hospitals should run their own validation studies, and the 2026 authors recommended local validation, workflows to manage false positives and alert silencing. Epic said tuning should happen before deployment. Accountable owner at each hospital and any regulatory review: Not reported.

S2 · Accountable owner · Not reported
Not reported.

A1 · Safe use · Claimed
Epic said real-world deployment needs analysis and fine tuning first, and later recommended training the model on each hospital's own data. [2] [3]

A2 · Human in the loop · Evidenced
The model raises best practice advisory alerts for clinicians, who treated about half of sepsis cases without an alert in the county emergency department study. [5]

A3 · Monitoring and assurance · Missing (independent source shows it was absent)
The 2021 authors said the model's ability to identify sepsis had not been adequately evaluated despite widespread use. [1]

A4 · Vendor AI · Claimed
Epic said its full mathematical formula and model inputs are available to administrators. [2]

A5 · Agent controls · Not reported
Not reported.

A6 · Standards and regulation · Not reported
Not reported. MedCity News says many decision-support models get little or no regulatory review, but does not state the model's regulatory status. [2]

What worked, what did not, what is unproven

WORKED

– The updated model showed improved discrimination for early sepsis prediction in the 2026 multicentre study: encounter-level area under the curve 0.82 to 0.92.

– Epic maintained the model still helped clinicians provide early interventions, and pointed to a University of Colorado Health preprint that found it more accurate than that site's early warning score; the preprint was not opened.

– At one 746-bed US academic trauma centre, a before-and-after study found that using the model as a screening test was associated with 44% lower odds of sepsis-related death; the authors call the study hypothesis generating and say more rigorous designs are needed.

DID NOT

– Michigan Medicine found an area under the curve of 0.63, missed 1,709 of 2,552 sepsis patients (67%) and alerted on 6,971 of 38,455 hospitalisations (18%).

– The model identified 183 of 2,552 sepsis patients (7%) who did not receive timely antibiotics, which the authors called low sensitivity compared with usual practice.

– At two county emergency departments in 2023, at Epic's recommended threshold of 6, the original model had sensitivity of 14.7% and positive predictive value of 7.6%, with a median alert lead time of 0 minutes.

– The updated model's positive predictive value stayed low at 0.13 to 0.26, with a high alert burden and high variation between sites.

UNPROVEN

– Whether the model improves patient outcomes: no randomised trial is reported in the sources used.

– How the updated model compares with the original at the same sites, which the 2026 abstract states as an aim but does not report in its results.

Timeline

Oct 2022 STAT reports Epic has revised the model, including a recommendation to train it on each hospital's own data [3]

Dec 2022 Harris Health in Houston implements the original model system-wide [5]

2023 Two county emergency departments evaluate the original model over the year [5]

Jun 2023 Single-centre study at Prisma Health reports lower sepsis-related mortality after the alert was switched on [6]

Aug 2023 Four US health systems begin collecting data after implementing the updated model, to March 2025 [4]

Feb 2026 JAMA Network Open publishes a multicentre validation of the updated model [4]

2 · Grade and SEAM assessment

MarLuc's opinion, made on the evidence above. How cases are graded: marluc.co.uk/case-studies/how-we-rate

Level of change and impact

Claimed: Not applicable. Grade: E, No measurable effect. Proof: Partly proved. Level of change: Not graded.

No level assessed: band E. A deployed clinical alert tool whose performance, once independently checked, was weak and whose benefit is unproved; the updated model improved discrimination but not precision.

Graded E. The model was in use at hundreds of US hospitals, yet independent testing found weak performance and a heavy alert burden, and no source here shows a measured benefit across sites. No source reports a proved harm or that the tool was withdrawn, so it is not graded F. The revised model improved discrimination, but precision stayed low.

The SEAM view and lessons learnt

The gap sat between a vendor tool and the local population it was applied to. The first independent test came after hundreds of hospitals were using the model, and the vendor's reply was that local tuning matters, which the later recommendation to train on each hospital's data echoes. For a larger organisation, the transferable point is to validate any vendor prediction model on its own patients, at the alert threshold it will actually use, before relying on it.

1. Validate vendor models on local data before go-live.
2. Measure false alerts and clinician workload, not only accuracy.
3. Re-test after the vendor changes the model.

Evidence

Score 3 of 4. Independent: three peer-reviewed validation studies by researchers not employed by the vendor; the vendor's counter-claims rest on an unopened preprint and an emailed statement.

3 · Original sources

Read these in full. To challenge a fact or a grade, use the contact form at marluc.co.uk or the link on https://marluc.co.uk/case-studies/epic-sepsis-model

[1] JAMA Internal Medicine: External Validation of a Widely Implemented Proprietary Sepsis Prediction Model in Hospitalized Patients
https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2781307

[2] MedCity News: Popular sepsis prediction model works 'substantially worse' than claimed, researchers find
https://medcitynews.com/2021/06/popular-sepsis-prediction-model-works-substantially-worse-than-claimed-researchers-find/

[3] STAT: Epic overhauls popular sepsis algorithm criticized for faulty alarms
https://www.statnews.com/2022/10/03/epic-sepsis-algorithm-revamp-training/

[4] JAMA Network Open: Multicenter Prospective Validation of an Updated Proprietary Sepsis Prediction Model
https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2845595

[5] JAMIA Open: External validation of the Epic sepsis predictive model in 2 county emergency departments
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11560849/

[6] Critical Care Explorations: Epic Sepsis Model Inpatient Predictive Analytic Tool: A Validation Study (Cull and colleagues, Prisma Health, 2023)
https://pmc.ncbi.nlm.nih.gov/articles/PMC10317482/

Epic Systems website: https://www.epic.com

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VERSION HISTORY