

New Developments in Sepsis Quality Measurement

June 25, 2025

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Disclosures

Dr. Dantes has served as a Medical Advisor for the U.S. Centers for Disease Control and Prevention (CDC). The findings and conclusions presented are those of Dr. Dantes and do not necessarily represent the views of the CDC or the U.S. Government.

Sepsis Outcome Measure

Measuring Sepsis Performance: SEP-1

- The Severe Sepsis and Septic Shock Management Bundle (SEP-1) measure is now part of the CMS Value-Based Purchasing Program (VBP)
- SEP-1 scores will affect a hospital's CMS reimbursement in FY26
- SEP-1 compliant care is associated with a median 1-day shorter LOS and 4-6% reduction in 30-day mortality.¹

Scoring SEP-1: For a sample of patient with severe sepsis or septic shock, hospitals report the percentage of patients who received sepsis care that met all parts of the 3- and 6-hour bundles below:

Diagnosis	Within 3 hours	Within 6 hours
Severe Sepsis	• Lactate • Blood culture prior to antibiotics • Antibiotic administration	• Repeat lactate • Perform volume status or perfusion exam
Septic Shock	• 30 mL/kg of IV fluid if hypotensive or elevated lactate	(in addition to above) • Vasopressors for persistent hypotension

SEP-1

Benefits

- Includes key universal aspects of early sepsis hospital care
- Associations between better SEP-1 performance and shorter length of stay and lower mortality
- In-use among CMS-reporting hospitals

Criticisms

- Specific parts of the SEP-1 measure have mixed efficacy data and could be improved
- Reporting is labor-intensive
- Only focuses on first 3-6 hours of hospital stay. Median sepsis hospitalization is 8-10 days.
- An outcome measure would better align with patient-centered goals, incentivize meaningful innovation and effective treatment courses

Challenges of a Sepsis Outcome Measure

- Use of diagnostic (billing) codes to define sepsis is subject to biases in awareness, financial incentives, and clinical judgement
 - Diagnostic coding can be manipulated
 - Need to define sepsis using objective criteria
- Quality measures akin to a “standardized test” for hospitals, however no two patients with sepsis are alike - wide range of infections and severity
 - Robust risk adjustment must account for differences in presentation. Consider two ends of the spectrum of sepsis:
 - A. Older patient with a urinary tract infection, mild confusion, and mild dehydration -> good prognosis
 - B. Patient with pneumonia unconscious at home, intubated in the field, loses pulse during the ambulance ride and EMS performing CPR upon arrival -> poor prognosis

Harvard Pilgrim Health Care Institute

- Funded by CDC - recently completed development of a risk-adjusted sepsis outcome measure
- Leverages nearly a decade of existing research on sepsis epidemiology using electronic health records
- Measure developed in collaboration with CDC, CMS, input from technical expert panel and patient representatives

Deciding on Outcome of Interest

- Many outcome measures use 30-day mortality
 - Feasible for measures focused on Medicare beneficiaries (CMS leverages claims and Social Security data)
 - Practical limitations for non-Medicare patients, very long lag time for results (~1 year)
- Proposal to use In-hospital Death or Discharge to Hospice
 - Many sepsis patients discharged to hospice die shortly afterwards. Use of either in-hospital death or hospice balances against variable use of hospice
 - Key data available at the time of discharge – faster feedback to hospitals
 - Data available via Fast Healthcare Interoperability Resources (FHIR)

Hospital Death/ Hospice vs 30-Day Mortality

Research Letter

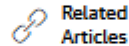
April 9, 2025

Concordance of 30-Day Mortality and In-Hospital Mortality or Hospice Discharge After Sepsis

Hallie C. Prescott, MD, MSc^{1,2}; Megan Heath, PhD¹; Namita Jayaprakash, MB, BCh, BAO, MRCEM³; et al

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JAMA. Published online April 9, 2025. doi:10.1001/jama.2025.2526



Sepsis contributes to 1.7 million adult hospitalizations and 350 000 deaths annually in the United States.¹ To encourage improvements in sepsis management and outcomes, the Centers for Disease Control and Prevention (CDC) and the Centers for Medicare & Medicaid Services (CMS) are developing a risk-adjusted outcome measure for community-onset sepsis hospitalizations.² Two candidate measures are (1) 30-day mortality after admission and (2) a composite outcome of in-hospital mortality or hospice discharge. While often preferred, 30-day mortality has drawbacks because postdischarge vital status data are not available in real time, causing a lag in outcomes assessment. Furthermore, 30-day mortality measures used in CMS programs rely on claims and social security data available only for Medicare and Medicaid beneficiaries, thus limiting the eligible population. To inform decision-making about which measure to implement for national benchmarking, we evaluated the 2 candidate measures in a multihospital cohort.

Among 37,200 patients with CO-sepsis at 67 hospitals:

- Hospital death: 11.6%
- Hospice discharge: 7.5%
- **Death/ Hospice: 19.2%**
- **30-day mortality: 19.3%**

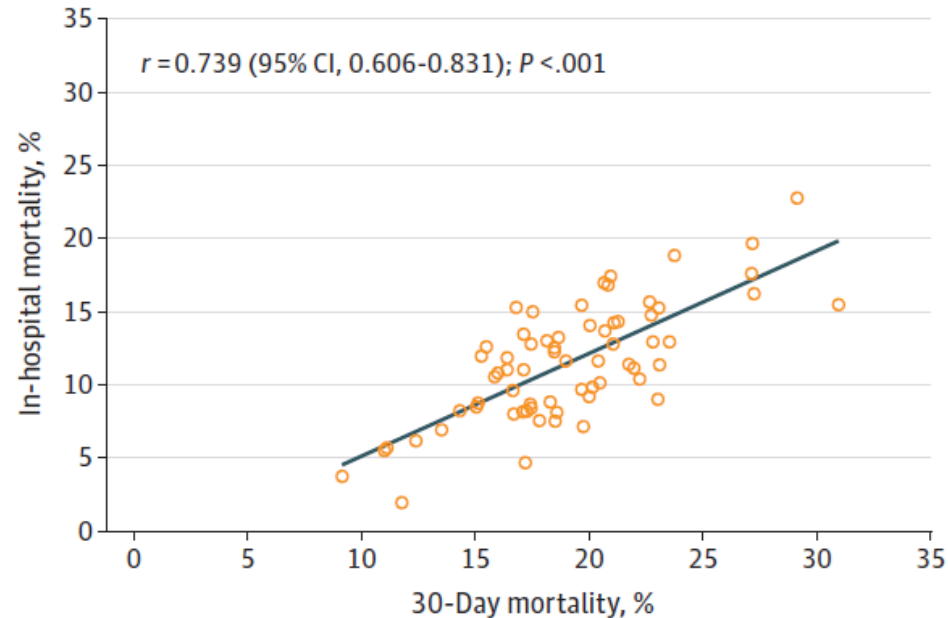
Concordance with 30-day mortality:

- In-hospital death: 92.0% (K=0.698)
- **Hospital death/ hospice discharge: 94.3% (K=0.815, p<0.001 vs in-hospital death)**

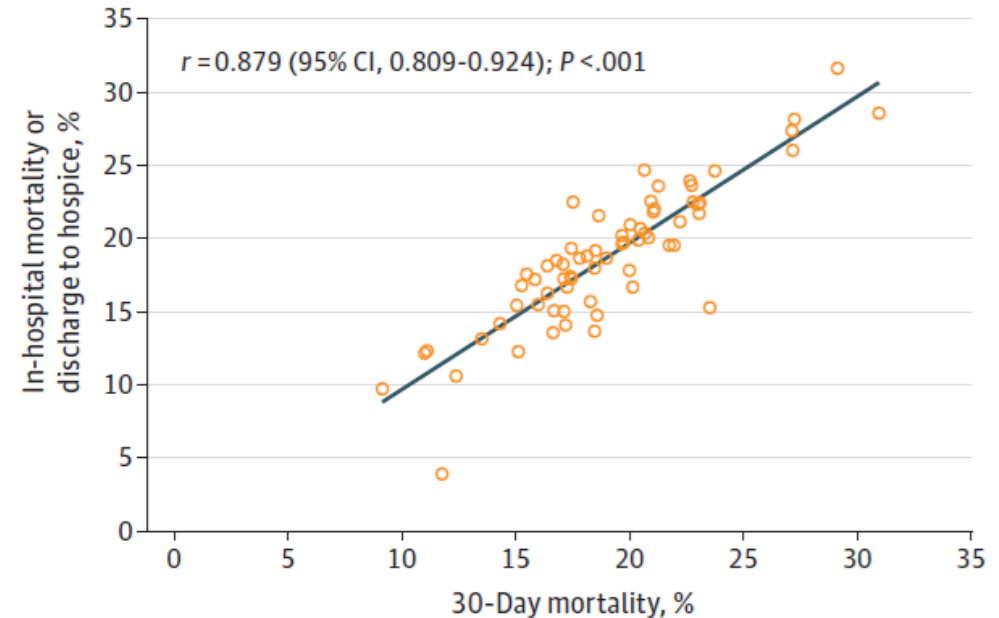
Hospital-Level Correlations

Figure. Hospital-Level Correlations Between Mortality Outcomes Among Patients With Sepsis

A Hospital-level correlation of 30-day mortality with in-hospital mortality among patients with sepsis



B Hospital-level correlation of 30-day mortality with in-hospital mortality or discharge to hospice



Better hospital-level correlation of hospital death/ hospice discharge
with 30-day mortality compared to hospital death alone

Original Article

Evaluating Potential Modifications to the Centers for Disease Control and Prevention's Adult Sepsis Event Definition: Impact on Sepsis Incidence, Outcomes, and Clinical Validity

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Proposed Sepsis Outcome Measure, part 1

	Adult Community-Onset (CO) Sepsis Standardized Mortality Ratio (SMR) Measure
Measure	Hospital-level SMR = (observed adult CO-sepsis in-hospital mortality & discharge to hospice) / (predicted CO-sepsis in-hospital mortality & discharge to hospice)
Denominator	- Predicted deaths among patients with community-onset sepsis, defined as: BOTH - Presumed Serious Infection* - Blood culture or Principal Diagnostic codes for infection or sepsis ≥4 Qualifying Antimicrobial Days (or 3 days if d/c alive), starting ±1 days of infection onset date AND - Acute Organ Dysfunction* (≥1 criteria within ±1 days of infection onset date) - Vasopressor initiation - MAP <65mmHg or SBP <90mmHg on at least 2 separate measurements within 3hrs - Invasive ventilation (any duration), new non-invasive ventilation OR high-flow nasal cannula for ≥2 calendar days - Creatinine ≥2x from baseline, and above sex-specific normal values - Total bilirubin level ≥2.0 mg/dL and 2x from baseline (<i>excluded for liver disease, hemolytic anemia</i>) - Platelet count <100 cells/μL and ≥50% decline from baseline (<i>baseline must be ≥100 cells/μL, excluded in hematologic or solid malignancy</i>) - Serum lactate ≥2.0 mmol/L *With any criteria met from initial presentation to before day 4

Proposed Sepsis Outcome Measure, part 2

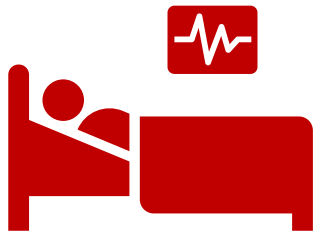
	Adult Community-Onset (CO) Sepsis Standardized Mortality Ratio (SMR) Measure
Numerator	Adult patients with CO-Sepsis who died during hospitalization or were discharged to hospice.
Risk Adjustment Variables	<i>Proposed - subject to change as final models are produced based on submitted data.</i> Facility-Level Variables - Hospital size (bed count) Patient-Level Variables - Age, sex, BMI, pregnancy related admission - Admission from facility (SNF, SAR, LTACH) - Infection site (by POA ICD-10 coding) - Comorbidities (AHRQ Elixhauser mortality index) - Sepsis Organ dysfunction criteria and additional labs (worst within 6hrs, or 24hrs if missing): mechanical or non-invasive ventilation, vasopressors, lactate, creatinine, platelets, hematocrit, WBC, anion gap, bilirubin, ALT, sodium, albumin, glucose, INR - Vital signs within 3hrs and 6hrs of presentation - Positive blood culture or COVID tests on admission
Exclusions	- Patients <18 years of age - Length of hospitalization >120 days - Prior enrolment in hospice <i>Transfer to, or transferred from another acute care hospital – may be subject to separate complimentary metric</i>

Stay Tuned

- Manuscripts with additional data forthcoming.
- Upcoming Fall 2025 submission to the Partnership for Quality Measurement for Endorsement consideration
- Submitted in May 2025 to the CMS Measures Under Consideration (MUC) List – the first step for CMS to use this measure in future rulemaking
- Hospital enrolment and use of the Sepsis Outcome measure using CDC's National Healthcare Safety Network soon...

Sepsis Structural Measure

SEP-1 and Early Sepsis
Identification and
Process Measures



Sepsis Outcome
Measures

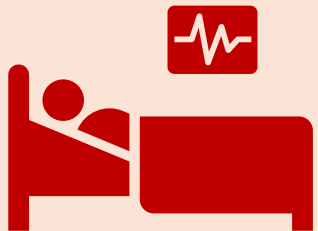


Average 8 days



Core Elements Measure

SEP-1 and Early Sepsis
Identification and
Process Measures



Sepsis Outcome
Measures



Average 8 days



CDC Hospital Sepsis Program Core Elements



Hospital Leadership Commitment

Dedicating the necessary human, financial, and information technology resources.



Accountability

Appointing a leader or co-leaders responsible for program goals and outcomes.



Multi-Professional Expertise

Engaging key partners throughout the hospital and healthcare system.



Action

Implementing structures and processes to improve the identification of, management of, and recovery from sepsis.



Tracking

Measuring sepsis epidemiology, management, and outcomes to assess the impact of sepsis initiatives and progress toward program goals.



Reporting

Providing information on sepsis management and outcomes to relevant partners.



Education

Providing sepsis education to healthcare professionals, patients, and family/caregivers.

CDC Hospital Sepsis Program Core Elements

- Provide guidance for monitoring and optimizing hospital management and outcomes of sepsis
 - "How to build a successful hospital sepsis program"
 - Emphasis on leadership support, personnel resources, quality improvement tools and implementation science
- Complement existing sepsis guidelines and facilitate implementation of recommended practices
 - Additional emphasis on sepsis management throughout hospitalization and recovery
 - Intended audience is U.S. hospitals and hospital systems
 - Applicable regardless of hospital type and population

	Proposed Hospital Sepsis Program Core Elements Measure
Measure	Measure score = Sum of Hospital Sepsis Program Priority Examples in use by hospital / Total Hospital Sepsis Program Priority Examples Percentile reported by stratification of hospital bed size (0-25 beds, 26-50 beds, 51-100 beds, 101-250 beds, 251-500 beds, ≥500 beds)
Denominator	28 Hospital Sepsis Program Priority Examples, as described in the CDC Core Elements document.
Numerator	Sum of Hospital Sepsis Program Priority Examples

Hospital Leadership Commitment - 4

“Our hospital has a senior leader (e.g., Chief Clinical Officer, Chief Medical Officer, or Chief Nursing Officer) who serves as an executive sponsor for the sepsis program.”

*55. Facility leadership has demonstrated commitment to improving sepsis care by: (Check all that apply; check at least one.)

- ☐ Providing sepsis program leader(s) with sufficient specified time to manage the hospital sepsis program.
- ☐ Providing sufficient resources, including data analytics and information technology support, to operate the program effectively.
- ☐ Ensuring that relevant staff from key clinical groups and support departments have sufficient time to contribute to sepsis activities.
- ☐ Appointing a senior leader to serve as an executive sponsor for the sepsis program.
- ☐ Identifying sepsis as a facility priority and communicating this priority to hospital staff.
- ☐ Having a sepsis coordinator who oversees day-to-day implementation of sepsis program activities
- ☐ None of the above.

Multi-Professional Expertise - 1

“Our hospital has a sepsis coordinator, who oversees day-to-day implementation of sepsis program activities.”

*55. Facility leadership has demonstrated commitment to improving sepsis care by: (Check all that apply; check at least one.)

- ☐ Providing sepsis program leader(s) with sufficient specified time to manage the hospital sepsis program.
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- ☐ Appointing a senior leader to serve as an executive sponsor for the sepsis program.
- ☐ Identifying sepsis as a facility priority and communicating this priority to hospital staff.
- ☐ Having a sepsis coordinator who oversees day-to-day implementation of sepsis program activities
- ☐ None of the above.

Action - 1

“Our hospital has implemented a standard process to screen for sepsis on presentation and throughout hospitalization.”

ANY of the following:

*56. Our facility uses the following approaches to assist in the identification of sepsis upon presentation to the hospital: (Check all that apply; check at least one.)

- ☐ Manual screening for clinical instability (e.g., MEWS, NEWS score)
- ☐ Electronic health record (EHR)-based screening for clinical instability
- ☐ Manual screening for sepsis criteria
- ☐ Electronic Health Record (HER)-based screening for sepsis criteria
- ☐ None of the above

AND

ANY of the following:

*57. Our facility uses the following approaches to assist in identification of sepsis throughout hospitalization: (Check all that apply; check at least one.)

- ☐ Manual screening for clinical instability (e.g., MEWS, NEWS score)
- ☐ Electronic health record (EHR)-based screening for clinical instability
- ☐ Manual screening for sepsis criteria
- ☐ Electronic Health Record (EHR)-based screening for sepsis criteria
- ☐ None of the above

Hospital Sepsis Program Core Elements Measure

Measure Goals:

- Promote practices to monitor and optimize hospital management and outcomes of sepsis, as described in the CDC Hospital Sepsis Program Core Elements
- Complement sepsis process and outcome-based measures to promote optimal patient care

Measure Score:

- Score of 0-28 points based on how many “Priority Examples” are implemented
- Stratification and percentiles based on hospital size categories

Data Collection and Feedback:

- Leverages the CDC National Healthcare Safety Network Acute Care Hospital Annual Survey, which nearly all US hospitals already complete.
- Currently completing second year of data collection.
- >5000 hospitals to begin receiving scores within NHSN application later this year

Validation

Positive correlation with CMS SEP-1 and Michigan HMS sepsis process and outcome measures.

Reliability

Total score reliability is low-moderate, reinforces role as a complimentary sepsis measure rather than a pay-for-performance metric.

Audit

Audit tool is under development. Opportunity to merge auditing of survey into existing CDC/CMS audits of other reportable safety events.

Summary of New Sepsis Measures Under Development

	CMS Measures Under Consideration (MUC) Submission	Partnership for Quality Measurement (PQM) Endorsement Submission	Hospital Enrollment
<i>“Outcome”</i> Adult CO-Sepsis Standardized Mortality Ratio Measure	Submitted May 1, 2025	Fall 2025	<i>Anticipated 2026-2027</i>
<i>“Structural”</i> Sepsis Core Elements Measure	Submitted May 1, 2025	Fall 2025	Fall 2025