WHITE PAPER

Sepsis Revenue Cycle

Could implementation of a host response sepsis test increase financial reimbursement for sepsis — one of the largest net loss DRGs for hospitals?

Cytovale® IntelliSep® SEPSIS TEST

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CURRENT STATE — CASE FOR CHANGE

The Hidden Role of Revenue Cycle Operations in Driving Up the Cost of Sepsis

$34M
Annual marginal loss per large US hospitals (>500 beds)[4]

Sepsis leads to ~1.7 million hospitalizations in the US annually[1] and accounts for 8.8% of all hospital costs (amounting to ~$40 billion in annual healthcare spending).[2] While the economic toll of sepsis on a macro level is well known, its impact on individual hospitals can run in the tens of millions of dollars annually. These costs are exacerbated by Diagnosis Related Group (DRG) downgrades, denials, and incomplete code capture.

For a large hospital with 100k annual Emergency Department (ED) visits, coding losses can add up. Sepsis DRG downgrades and denials by payors **approach ~12% across healthcare systems**,[3] leading to a loss in revenue of $1–2M annually.

In addition, the overall loss in revenue to hospitals for incomplete code capture in sepsis can lead to an annual revenue opportunity of and additional $1–3M in reimbursement revenue.

1. Updated estimates of sepsis hospitalizations at United States academic medical centers; *J Am Coll Emerg Physicians Open*. 2022 Jul 16;3(4):e12782
2. National Inpatient Hospital Costs: The Most Expensive Conditions by Payer, 2017; Healthcare Cost And Utilization Project; Agency for Healthcare Research and Quality https://www.ncbi.nlm.nih.gov/books/NBK561141/pdf/Bookshelf_NBK561141.pdf
3. https://marketplace.optum.com/content/dam/change-healthcare/marketplace-assets/outcomes-and-insights/2024-denials-index.pdf
4. Sepsis poses a cost-containment challenge in the face of the COVID-19 pandemic [David Kulick et al.] Healthcare Financial Management Association [July 2020]

Potential Financial Impact of an IntelliSep-Informed Revenue Cycle

SEPSIS IN THE ED

ANNUAL ED VISITS		SUSPECTED INFECTION		HIGH PROBABILITY		SUSPECTED SEPSIS
100K visits/year	×	15% of ED visits	×	40% of sepsis[14]	=	6,000 cases/year

DOWNGRADES AND DENIALS

SUSPECTED SEPSIS		SEPSIS DRG		SEPSIS DRGs DOWNGRADES/DENIAL		AVG. LOSS PER DENIAL		ESTIMATED LOSS
6,000 cases/year	×	50% of suspected sepsis	×	12% of sepsis DRG	×	$5K per case	=	$1.8M per year

INCOMPLETE CODE CAPTURE

SUSPECTED SEPSIS		POTENTIAL CODE CAPTURE		INCOMPLETE SEPSIS CODE CAPTURE		AVG. REVENUE OPPORTUNITY		ESTIMATED OPPORTUNITY
6,000 cases/year	×	30% of suspected sepsis	×	20% of potential code capture	×	$4.5K per case	=	$1.6M per year

Early accurate diagnosis is the critical lynchpin enabling proper documentation and revenue cycle processes

How Diagnostic Uncertainty and Documentation Variability Compromise Sepsis Coding Accuracy

Diagnostic Uncertainty

Sepsis is currently defined as a dysregulated host response to infection, leading to multi-organ failure,[5] though historical definitions continue to cause challenges (see inset). Regardless of definition, for every one hour of treatment delay for septic shock, there is a 4–9% increase in sepsis mortality.[6] Since prompt diagnosis and treatment is critical, clinicians often need to act without perfect information. Unfortunately, standard tools available are flawed:

Blood cultures:
Are the gold standard for diagnosis of blood stream infection (BSI), but they require long processing times and ~28–49% sepsis cases are culture negative.[7]

Other blood biomarkers (C-reactive protein, procalcitonin, WBC count, etc.)**:**
Suffer from low sensitivity and/or specificity for sepsis.[8]

Sequential Organ Failure Assessment (SOFA) score:
Relies on time-consuming testing, which is difficult to obtain in a timely manner.

All of these tests create uncertainly for definitive diagnosis of sepsis.

Sepsis Definitions

Since 1992 there have been three editions of the sepsis definition (Sepsis -1, -2 and -3). While many private payers have adopted Sepsis-3 criteria for claim validation, CMS and some hospitals continue to use Sepsis-2 as well. Sepsis-3 added SOFA score increase as a key requirement. Consequently, a review in a representative hospital system found that 24% of cases meeting Sepsis-2 criteria did not meet Sepsis-3 standards.[9] This, and other reports[10] have highlighted how differences in the sepsis definition may impact coding.

5. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3); *JAMA*; 2016;315;(8):801-810. doi:10.1001/jama.2016.0287
6. Kumar et.al. Critical Care Medicine 2006
7. Culture-negative severe sepsis; *Chest*. 2016 Dec;150(6):1251-1259. doi: 10.1016/j.chest.2016.08.1460
8. Diagnostic Challenges in Sepsis; *Curr Infect Dis Rep*. 2021 Oct 25;23(12):22. doi:10.1007/s11908-021-00765-y
9. Sepsis-2.5: Resolving Conflicts Between Payers and Providers; *Crit Care Explor*. 2023 Aug 25;5(9):e0970. doi: 10.1097/CCE.0000000000000970
10. A Comparison of Sepsis-2 (Systemic Inflammatory Response Syndrome Based) to Sepsis-3 (Sequential Organ Failure Assessment Based) Definitions-A Multicenter Retrospective Study. *Crit Care Med*. 2020 Sep;48(9):1258-1264. doi: 10.1097/CCM.0000000000004449

Sepsis Documentation and Coding Gaps

Given this uncertainty, a sepsis diagnosis may not be documented consistently in the chart or discharge summary, particularly if sepsis resolved during the hospital stay. Missing or inconsistent language can lead to perceived diagnostic inaccuracy and weakens the sepsis DRG assignment at the hospital, leading to either **incomplete code capture** or DRG **downgrades**. Also, documentation gaps open the door for **denials**.[11] Even when sepsis codes are appropriately assigned, missing inputs for SOFA scores may lead to rejection of sepsis claims by payers (see "Sepsis Definitions" inset p.2), and DRGs are downgraded to localized infections, or even chronic conditions in absence of trending data.[12, 13]

Beyond definitional inconsistency and missing data, incomplete code capture and/or denials also stem from gaps in infection documentation or ambiguity about timing and causation (e.g., sepsis present on admission or developed during hospital stay). This leads to incorrect sequencing of codes and internal contradictions within the medical record.

Early, accurate sepsis diagnosis is the key to enhancing documentation and coding.

REIMAGINING THE FUTURE—IDEAL STATE

From Diagnostic Clarity to Coding Confidence: The IntelliSep Advantage

The IntelliSep Solution

IntelliSep® (Cytovale, San Francisco, CA) is a FDA-cleared test that objectively measures the immune dysregulation that defines sepsis, independent of infection source or shifting diagnostic criteria.

IntelliSep test results provide a powerful risk stratification tool for patients who present to the emergency department (ED) with signs and symptoms of infection.

Because IntelliSep measures the underlying biology, it also provides a definition-agnostic marker of sepsis that can potentially enhance documentation and coding confidence.[14,15]

IntelliSep Bands and Interpretation[14]

BAND 1 LOW RISK
14.4% Rate of Infection,
17.3% Rate of Sepsis when Infected

BAND 2
34.1% Rate of Infection,
55.4% Rate of Sepsis when Infected

BAND 3 HIGHEST RISK
66.8% Rate of Infection,
83.6% Rate of Sepsis when Infected

11. Defend Against Sepsis Denials: A Root Cause Analysis for DRG Downgrades; by Adi Tantravahi [Cofactor]
12. Sepsis Denial Rationales: Response From The Sepsis-3 Lead Author https://www.pinsonandtang.com/resources/sepsis-denial-payer-sepsis-3-author/#:~:text=No%20specific%20volume%20requirement%20was,counted%20towards%20meeting%20SOFA%20criteria
13. Sepsis-3 Denials Grow in Commercial Payer World, But Hospitals May Overturn Some Fast; Report on Medicare Compliance [Volume 27, Number 2 • January 15, 2018]
14. O'Neal et.al. Academic Emergency Medicine 2024
15. See the IntelliSep Instructions for Use for all cleared claims, limitations, and performance data

CASE STUDY

Franciscan Missionaries of Our Lady Health System

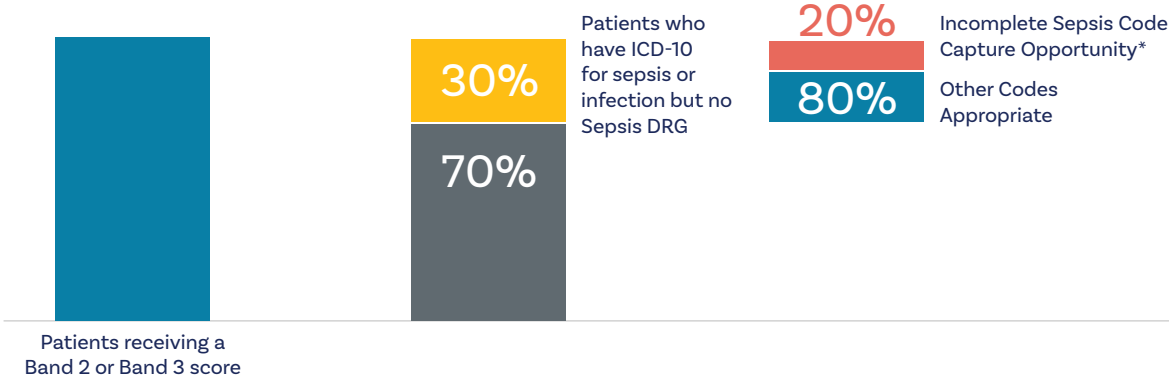
The Population

- **IntelliSep implemented at 5 hospitals**
- **356,746 ED visits completed between Sep. 2023 – Oct 2025 (Annual ED Census ranged 32,000–80,000)**
- **45,737 IntelliSep tests completed between Sept. 2023 – Oct 2025**
- **Bands 2 and 3 together constitute about 40% of all test results**

Documentation and Coding-Capture Gap

Analysis revealed that there is a significant number of patients (30%) identified at high risk for sepsis by IntelliSep who receive ICD-10 codes for sepsis or infection as a secondary diagnosis, but not a DRG for sepsis. Among those patients, there was potential incomplete sepsis documentation and/or code capture for 20% (based on physician-adjudicated sepsis in IntelliSep research).

This presents an opportunity for improving code capture for 6% of the total population of high-risk sepsis patients who had an ICD-10 code for sepsis or infection (30% × 20% = 6%). This translates to a $4.9M in potential revenue from optimizing coding (45,737 × 40% × 6% × $4,500 = $4.9M).



Takeaways

6% of Band 2 and 3 patients with ICD-10 for sepsis or infection are high risk for incomplete sepsis code capture

$4.9M potential coding opportunity
If the IntelliSep Band result were considered in the documentation of sepsis, potential for incomplete code capture may be limited.

* Non-sepsis DRGs observed: DRG 698, DRG 177, DRG 193, DRG 689, DRG 291, DRG190, DRG 682 (Payment levels average $4500 less than DRG 871)

CASE STUDY

Franciscan Missionaries of Our Lady Health System (FMOL)

Denials/Downgrades risk

DRG 871 accounts for ~80% of all Sepsis DRGs and is the most common DRG downgraded or denied.[16] From September 2023 to October 2025, FMOL coded 5,891 patients as DRG 871 (~77% of medical Sepsis DRGs). Based on industry-wide patterns, an estimated 12% of these patients are expected to be downgraded or denied by insurance,[17] affecting an estimated 707 claims. Sepsis DRGs (particularly DRG 871) are frequently downgraded to lower acuity codes such as UTI (DRG 689) or pneumonia (DRG 193). This typically results in $5,000 less reimbursement per claim (average ~$5,000/claim).[18]

5,891 patients with sepsis DRG

12% downgrade rate

× $5,000 avg. loss per patient

$3.5M revenue loss per year

Takeaways

$3.5M reimbursement opportunity from more appropriate documentation and downstream coding

16. Defend Against Sepsis Denials: A Root Cause Analysis for DRG Downgrades; by Adi Tantravahi [Cofactor] https://www.cofactorai.com/post/defend-against-sepsis-denials-a-root-cause-analysis-for-drg-downgrades
17. Optum 2024 Revenue Cycle Denials Index: https://marketplace.optum.com/content/dam/change-healthcare/marketplace-assets/outcomes-and-insights/2024-denials-index.pdf
18. Combating Denials and DRG Downgrading; https://insights.panaceainc.com/wp-content/uploads/2017/10/COMBATINGDENIALS.pdf

IntelliSep delivers objective, FDA-cleared sepsis risk assessment — stratifying patients up front and driving more accurate diagnosis and documentation.

How IntelliSep Can Help

1. IntelliSep Brings Objectivity to Sepsis Diagnosis

- Novel and FDA cleared for sepsis risk assessment[19]
- Consistent performance across sepsis definitions[20]

2. Aids in the Identification of High and Low Sepsis Risk Patients Up Front

High-Risk patients

Encourages providers to look for (and document) organ dysfunction earlier, increasing the likelihood that it is recognized, appropriately attributed to sepsis and explicitly documented with all necessary components.

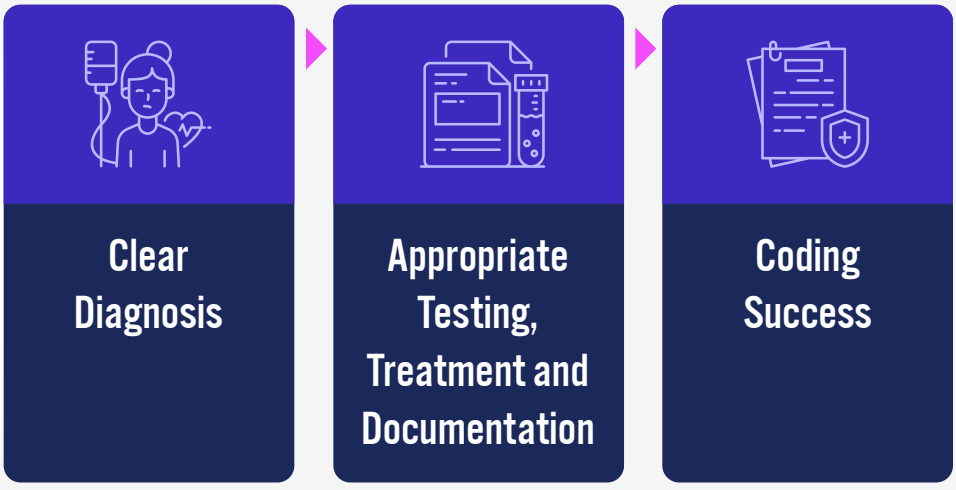
Low-risk patients

Drives providers to explore alternate non-sepsis diagnoses or reconsider whether a sepsis diagnosis is appropriate.

3. Supports a Standardized Clinical Validation Process

- Allows the identification of vulnerable claims before submission
- Documentation of organ dysfunction and causation more clearly using rapid EHR documentation tools and aids
- Improved accuracy and consistency of documentation across departments

8-Minute Test Time



19. https://www.accessdata.fda.gov/cdrh_docs/reviews/K220991.pdf
20. Cellular host response sepsis test for risk stratification of patients in the emergency department: A pooled analysis. Acad Emerg Med. 2024;31:883-893. doi:10.1111/acem.14923

Conclusion

1. Accurate diagnosis and documentation is fundamental to revenue cycle optimization.

2. Diagnostic uncertainty in sepsis and variability in documentation related to the condition creates potential for revenue cycle inefficiencies.

3. The key missing link has been a definitive diagnostic for sepsis to enable hospitals to appropriately document these cases.

4. IntelliSep offers clinicians early insight into sepsis risk so they can confidently diagnose, treat, and document the condition, all of which support appropriate coding.

5. A case study example suggests a potential annual opportunity of $4.9M from incomplete code capture and $3.5M from avoiding downgrades and denials, which could at least in part be resolved using IntelliSep.

Cytovale®

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