SEPSIS A FIRST-OF-ITS-KIND NATIONAL HOSPITALIST STUDY

amplifire
HEALTHCARE ALLIANCE

A New Pathway to Reduce Sepsis Morbidity and Mortality

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With more than 1.2 million Americans afflicted with sepsis annually, and 200,000 dying as a result, sepsis is a major public healthcare crisis. In the world of stroke, they say "time is brain." In sepsis, "time is organ function." Early diagnosis and treatment can be the difference between life and death.

Every hour that a sepsis diagnosis is missed increases mortality 8%.

In recent years, the scale of the problem has driven new, international efforts to improve sepsis care. No specialty "owns" sepsis. It's all hands on deck. There are newly devised protocols, sepsis teams, guidelines, and alliances to combat sepsis. Providers, payers, researchers, risk underwriters, accreditors, and regulators are all on notice to reduce sepsis morbidity and mortality.

There are isolated, local successes. Intermountain Healthcare in Salt Lake City reduced sepsis mortality by 70% through innovation and organizational grit…and knowledge.

Our first-of-its-kind national hospitalist sepsis study was designed as a clinical intervention using the Amplifire training tool, which delivers a groundbreaking learning experience and advanced analytics. The goal was to acquire data on what doctors and nurses know about sepsis. Can they recognize sepsis at an early stage? Do they know the evidence supporting treatment guidelines? Are they confident about how to respond?

Amplifire focuses learners' time where they need it the most. As a result, clinicians with high amounts of pre-existing knowledge completed the course in an average of 27 minutes. Clinicians with low pre-existing knowledge took an average of 75 minutes to finish. Overall, the average learner took 46 minutes.

Sepsis Findings and Takeaways

Sepsis Crisis

- More than 1.2 million Americans are afflicted with sepsis every year
- Every hour that a sepsis diagnosis is missed increases mortality by 8%
- Sepsis is the most expensive cause of hospitalization (AHRQ)

The Challenge

- Sepsis is often undiagnosed or mistreated
- Guidelines around treatment continue to change
- Efforts to improve management have been local and not scalable

First Nationwide Intervention

- 23 participating health organizations
- 1,245 participating clinicians
- Based on a learning tool that delivers optimal under-standing and ground-breaking analytics

The Results

- 7,795 instances of confidently held misinformation–believed true, but actually inaccurate
- 14,500 instances of doubt or uncertainty
- Clinical implications for action by Infection Control authorities
- High variance among doctors

Legend: Confidently Held Misinformation | Uncertain | Confident & Correct
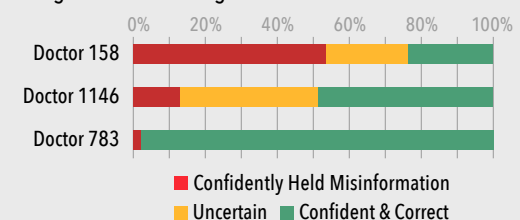
Confidently Held Misinformation (CHM) –*The most important healthcare metric you've never heard of…*

Confidently Held Misinformation lives in the minds of all clinicians and is one of the largest contributors to costly medical error.

CHM exists when a clinician is sure they are right, but they are wrong. It creates misjudgments and mistakes. Misplaced confidence can be perilous—especially in patient care.

Amplifire has the unique power to detect and correct CHM. The platform requires learners to state their certainty when they answer questions.

The system then classifies which answers were answered confidently but incorrectly—representing confidently held misinformation—and customizes a module in real time that will lead the learner to rapid mastery of the topic.

The cognitive science behind the platform has proven itself in over one billion learner interactions.

Finding and Fixing the CHM that Affects Performance

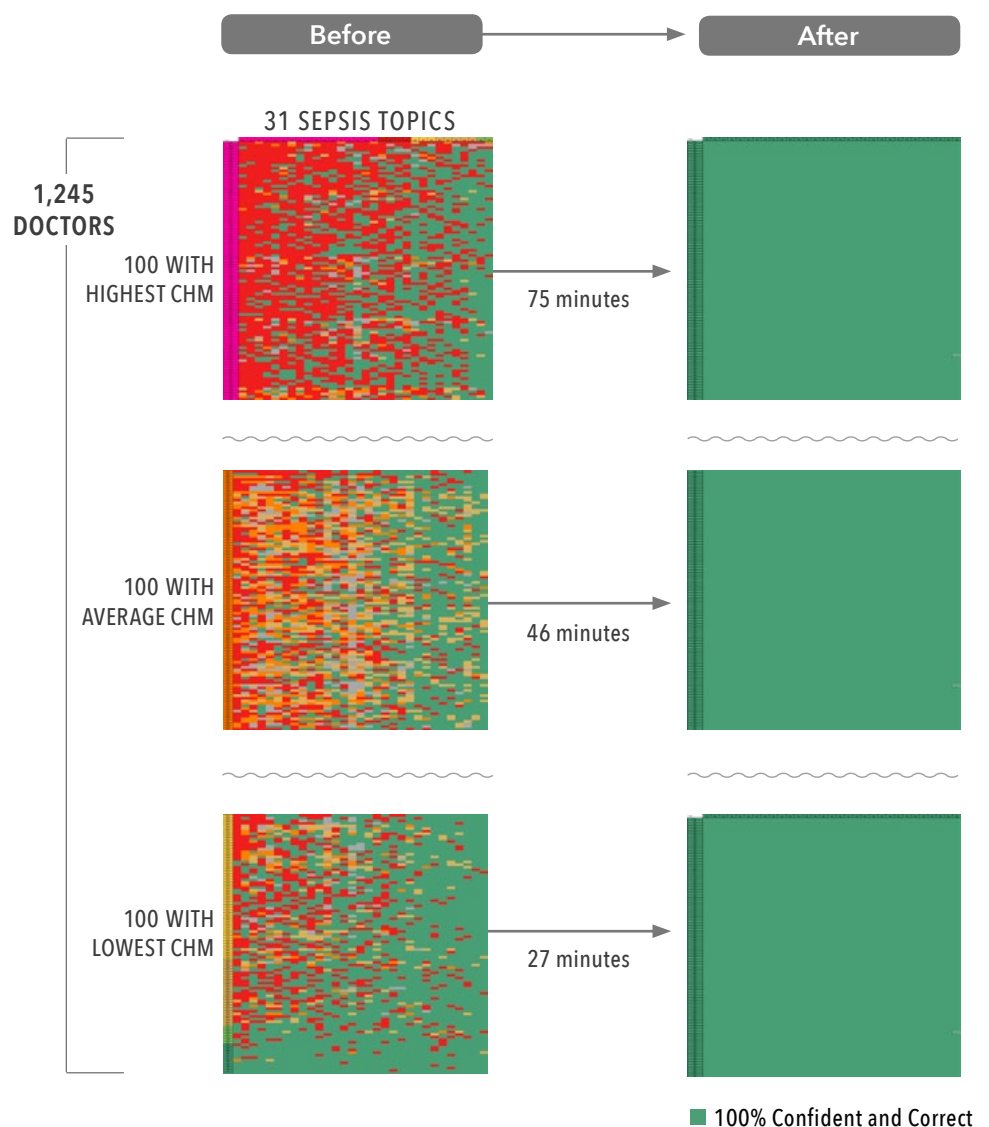### Knowledge and Confidence About Sepsis Before and After Amplifire

OVERALL RESULTS

Knowledge before Amplifire

- 🟥 22% Confidently Held Misinformation
- 🟧 42% Uncertainty
- 🟩 36% Confident and Correct

Observations

- 7,795 instances of confidently held misinformation found and fixed

- 14,500 instances of uncertainty found and fixed

- The variation of knowledge was high, with some doctors misinformed and others showing confident mastery of the topic. The most knowledgeable are nearly 100 percent confident and correct about sepsis. The least knowledgeable revealed misinformation about more than half the topics

- Doctors who were most misinformed or uncertain spent well over an hour in the module, while those who already knew much about sepsis spent only 27 minutes

- By the end of the course, 100% of the clinicians who completed were confident and correct on all the information

Before ➞ **After**

31 SEPSIS TOPICS

1,245 DOCTORS

100 WITH HIGHEST CHM — 75 minutes

100 WITH AVERAGE CHM — 46 minutes

100 WITH LOWEST CHM — 27 minutes

🟩 100% Confident and Correct

Sample Observations: Clinical Challenges and Implications

The study was conducted by an alliance of prestigious healthcare organizations concerned with high rates of sepsis. The alliance enlisted 23 organizations to recruit physicians and advanced practitioners from hospital medicine, emergency medicine, and critical care medicine to take an accredited, evidence-based, 31-question sepsis knowledge and performance course on a confidence-based learning platform called Amplifire.

The study ran from mid-August through early October 2017. Of the 3,600 clinicians invited, 1,245 (34%) completed the course during the study period. Overall, 85% of the learners were from the specialty of hospital medicine; 72% were physicians.

Amplifire probes the accuracy of a learner's knowledge and the confidence with which it is held. Confidence leads to action, and action to outcomes. When people know they don't know a correct action for a given situation, they do nothing. When they are uncertain, they hesitate. When they are confident, they act. High-quality outcomes result when clinicians are both confident and correct in their knowledge. The study found key areas that needed remediation:

Source Awareness

Almost half of the clinicians (47%) indicated that the urinary tract is the most likely source of sepsis—but the lungs are implicated five times more often. Only about a third (33%) of the clinicians selected the correct response—and only 19% were confident about it.

• **Clinical Implication:** These kinds of misunderstandings can delay clinicians' ability to locate sources of infection or abscesses, causing mis-targeted antibiotic use and overuse of broad-spectrum antibiotics.

Age Bias

Nearly a third of participants (29%) estimated that patients over age 85 are diagnosed with sepsis five times as often as those under 65; it's actually 30 times more often.

• **Clinical Implication:** This poor sensitivity to the age-related increase in sepsis risk could bias clinicians against a sepsis diagnosis or delay that diagnosis for an especially vulnerable population.

Guideline Confusion

Only 21% of clinicians knew that lactate level was removed as a criterion for sepsis in the Sepsis-3 definition. Most (60%) thought that lactate levels of 2 or 4 were included in the criteria.

• **Clinical Implication:** Ever-changing and conflicting guidelines are leading to misunderstandings and confusion—and, likely, non-adherence and variation in care.

Communication Risk

As team-based care takes hold, communication is becoming an ever more critical part of patient care. According to the Joint Commission, the prevalence of communication failures as a root cause of sentinel events nearly doubled from 1999 to 2005. Only about a third of the participants (35%) were aware of this increase.

• **Clinical Implication:** A lack of appreciation for the increasing importance of communication in time-critical care has serious repercussions for patient outcomes.

Monitoring Risk

The clinicians were presented with a scenario in which a patient's systolic blood pressure dropped 46 mmHg in two hours—just shy of the criterion for general septic hypotension. Only about a third of clinicians (35%) recognized that the swift, sharp decline in blood pressure was sufficient for a diagnosis of septic shock. More (40%) would have waited another hour based on time-stamped blood-presssure readings.

• **Clinical Implication:** Given that the absolute mortality rate during septic shock increases at 8% per hour, failure to detect the change over time criteria versus the threshold criteria could have life-or-death consequences.

Fluid Management

More than half of clinicians (55%) thought the volume-restoring effect of resuscitation by fluid bolus lasts 2-4 times longer than it actually does; only 29% knew that fluids dissipate into tissue in under an hour.

• **Clinical Implication:** Misunderstanding fluid resuscitation dynamics can interfere with a doctor's ability to determine when resuscitation is sufficient for sustaining cardiac output and when leaked extravascular fluids begin to interfere with organ function.

Knowledge and Confidence Variation by Healthcare Organization and Doctor

As seen below, variation before Amplifire in knowledge, misinformation, and uncertainty can be seen at both the organizational and individual levels.

Observations

- At healthcare organizations, average CHM ranged between 12% and 25%

- Organization-wide levels of confident, accurate knowledge ranged from a low of 25% to a high of 52%

- Organizations overall were highly uncertain about the latest evidence-based sepsis guidelines

- The most knowledgeable doctor at Organization 15 had only 5% CHM

- The riskiest doctor showed 52% CHM

Healthcare Organization Variation
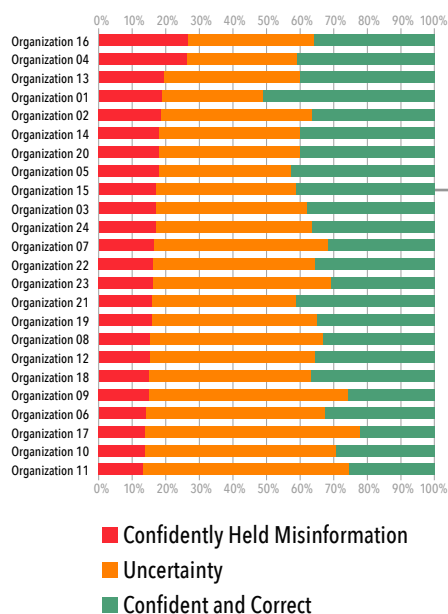
Doctor Variation at Organization 15

- ■ Confidently Held Misinformation
- ■ Uncertainty
- ■ Confident and Correct
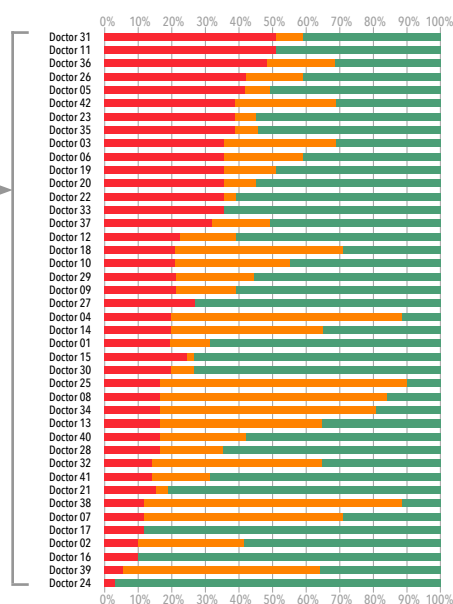
About Amplifire

This study was conducted using Amplifire, the leading e-learning platform, which was built on the most current discoveries in cognitive science. The Amplifire learning algorithm detects and corrects the knowledge gaps, doubts, and misinformation that exist in the minds of clinicians in every healthcare organization. The platform adapts to the needs of individual learners as they take an Amplifire course until mastery of each topic is achieved.

Healthcare organizations have adopted Amplifire as a core operating asset. They have transformed training from a rote activity, where managers can only hope for results, into a strategic, measurable tool that delivers a clinical workforce aligned with the latest evidence-based medicine.

After the platform finds and fixes CHM and uncertainties held by clinicians, it delivers advanced analytics to organizations and managers that pinpoint where learners struggled, from the organization and unit level down to the individual learner.

With more than a billion learner interactions, Amplifire harnesses research, learner feedback, and artificial intelligence to provide a faster and more engaging path to mastery. This powerful combination has made Amplifire an innovative leader in the learning industry.

Amplifire has been deployed in multiple healthcare initiatives focusing on sepsis, CLABSI, CAUTI, SSIs, pressure injuries, *C. difficile*, patient falls, and other topics of avoidable patient harm. Additional courses are currently under development.

To learn more about the platform and its application in healthcare, contact us at:

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