Webinar Series: Across the Continuum of Care
Unlocking the Potential of Artificial Intelligence in Sepsis Care

Presenters:

Scott Stewart, LSSBB, PMP, CSM
Senior Process Improvement Engineer
Sentara Healthcare

Michael Hooper, MD, MSc
VP Medical Affairs
Sentara Norfolk General Hospital

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Sepsis Alliance gratefully acknowledges the support provided for this webinar by bioMérieux and Jvion.

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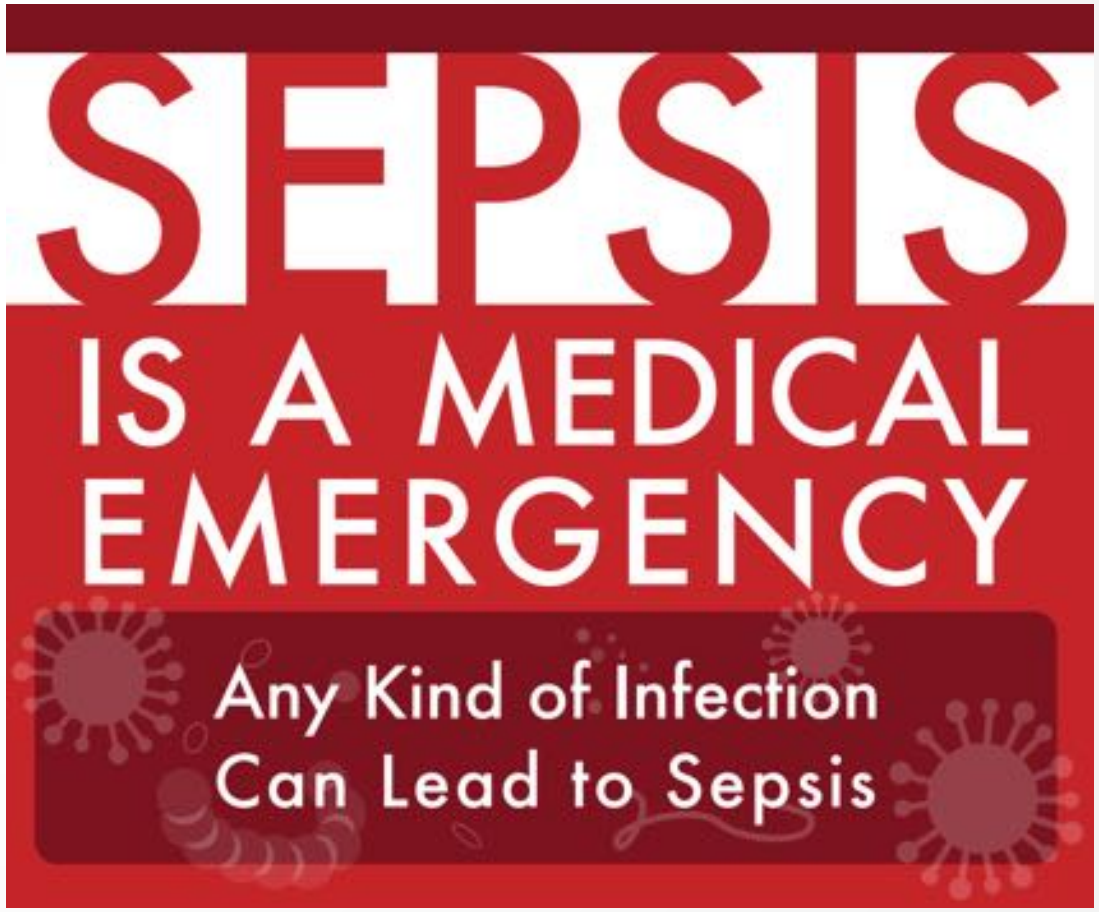
Sepsis Alliance Mission

SEPSIS ALLIANCE

To save lives and reduce suffering by raising awareness of sepsis as a medical emergency

https://www.sepsis.org



Presenter Biographies

SEPSIS ALLIANCE

Scott Stewart, LSSBB, PMP, CSM

Senior Process Improvement Engineer

Sentara Healthcare

- Has completed multiple projects in corporate change / innovation
- Holds certifications in project management and agile scrum methodologies
- Lean six sigma black belt

Michael Hooper, MD, MSc

VP Medical Affairs

Sentara Norfolk General Hospital

- Extensive clinical and research experience in sepsis detection and treatment
- Published original research on electronic systems for detecting patients with development sepsis in ICUs
- Current executive committee member of VICTAS trial

Unlocking The Potential of Artificial Intelligence in Sepsis Care

August 7, 2019

SENTARA®

Learning objectives

By the end of today's session, you should be able to:

- Define the term AI and list the types of AI healthcare solutions available
- Summarize the potential impact of AI on sepsis care
- Recap AI-specific workflow and adoption considerations
- Apply the lessons learned at Sentara Healthcare to their assessment and implementation of AI

Understanding Healthcare AI

Unlocking The Potential of Artificial Intelligence in Sepsis Care

Why AI and Why Now

This era is different because of three forces*:

Frustration with legacy medical systems

Ubiquity of networked smart devices

Acclimation to convenience and at-home services like those provided through Amazon

"Artificial Intelligence for Health and Health Care"; JASON The MITRE Corporation. JSR-17-Task-002

Projected Market Growth

- Current revenue contribution as a percent of total AI market revenue in 2018:
  - **50%** clinical applications
  - **30%** operational applications
  - **20%** financial applications
- Estimated that the healthcare AI market will increase at a compound annual growth rate (CAGR) of between **47% and 50%**
- Projected to reach **$36.1** billion by **2025**

Frost and Sullivan report

Regulatory Response to AI

Congress	CMS	FDA	JASON
• Fundamentally Understanding the Usability and Realistic Evolution (FUTURE) of Artificial Intelligence Act of 2017 • Provides for the establishment of a Federal Advisory Committee on the Development and Implementation of AI	• Artificial Intelligence Health Outcomes Challenge • Exploring how to harness AI to improve health outcomes in inpatient and post-acute settings	• Software pre-certification pilot program • Voluntary model to monitor and regulate innovative AI and machine learning that supports decision making	• Report on AI in healthcare • Highlights challenges that exist in adoption, the rise of smart devices, training databases, data gaps, development, and safeguards

*Framing AI for Healthcare—Augmented Intelligence**

- "General AI:" computational methods that produce systems that exhibit intelligent behavior at least as advanced as a human across the range of cognitive, emotional, and social behaviors
- "Narrow AI:" computational methods that address specific application areas, such as playing strategic games, language translation, self-driving vehicles, and image recognition

AI methods and tools for the foreseeable future are better characterized as narrow AI that augments human intelligence (augmented intelligence)

**FUTURE of Artificial Intelligence Act of 2017*

AI Solution Categories

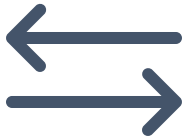
	Disease Risk	Clinical Workflow	Claims Management	Fraud Detection
Before AI	Diagnosis and treatment happen after symptoms are present	Resources are allocated without an understanding of who is impactable and how	Manual claims processing that is time consuming and delays payment	Rules-based systems catch some fraud. Others are paid and investigated later
After AI	At-risk patients are identified before symptoms and interventions are recommended **10-50% reduction in target incidences**	Resources are directed to the right patients at the right time with the right care/interventions **27-75% decrease in resource demands**	Improved claims processing, decreased costs/losses, and streamlined denials management process **Reduction in the 24% of denied claims**	Faster, more accurate identification of fraudulent claims and identification of new fraud patterns **Reduced cost and improved identification**

Applying AI to Sepsis Care and Prevention

Unlocking The Potential of Artificial Intelligence in Sepsis Care

Sentara Healthcare's AI Solution

- Technology based on a sophisticated mapping technique that has proven effective at solving complex challenges such as quantum mechanics, search and consumer behavior, and facial recognition
- The foundation enables the solution to answer hundreds of questions about a patient and extrapolate the most effective interventions
- For each patient, the solution delivers:



The trajectory of a patient toward an adverse event

A determination if something can be done to change the outcome

The most effective interventions that will mitigate a patient's risk

Thinking About Sepsis Prevention Differently

Secondary Prevention

With AI

- ✓ Interventions implemented after disease has begun but, **before symptoms**
- ✓ Earlier identification to improve time to treatment

Secondary Prevention

Hospital Current State

- Infection moves to sepsis to septic shock
- Recognition and management per facility protocol
- Sepsis Care Bundles
- Sepsis Alerts & RRT

Primary Prevention

With AI

- ✓ Manage risk factors (clinical & socioeconomic)
- ✓ Measures that prevent the onset of infection or injury **before the disease process begins**
- ✓ Prevention approaches with environmental risks (e.g., sanitation)

Tertiary Prevention

Hospital Current State

- Intensive Care Interventions
- Prevent sequelae (death and disability)
- Optimizing the post-sepsis health trajectory

Inpatient Sepsis: What's Currently Missing

Patient admitted to hospital for major surgical procedure

Surgery went well. No complications.

Patient transferred to medical-surgical unit on POD 2

POD 8:

- Patient confused/ hallucinating
- Vitals @ 3pm: HR 115, RR 18, SBP 89, T 35.3
- Rapid Response not called

POD 9:

- Patient still confused
- No urine output since 11pm
- Vitals @ 11am: HR 120, RR 11, SBP 81, T 35.6

Secondary Prevention

Rapid Recognition & Management

- MD notes suspicion of Sepsis
- MD orders: Blood cultures, IV Albumin, and IV antibiotics

Tertiary Prevention

Preventing Sequelae

- Patient transferred to ICU on POD 9
- Lactate drawn POD 10

Patient deceased one month post procedure

Inpatient Sepsis with AI

Patient admitted to hospital for major surgical procedure

Surgery went well. No complications.

Patient transferred to medical-surgical unit on POD 2

- ✓ RN D/C Foley POD 2
- ✓ Assesses surgical incision
- ✓ Patient continues with mobilization and Incentive Spirometer use

Secondary Prevention with AI

Rapid Recognition & Management

- RN Orders Lactate & CBC
- Escalates to MD to increase sepsis surveillance
- MD Orders Cultures, Antibiotics, Fluid

Primary Prevention with AI

- ✓ RN receives alert for high risk for sepsis
- ✓ RN monitors potential sources for infection
- ✓ RN helps patient with incentive spirometer and orders PT daily for early mobilization
- ✓ RN and healthcare team ensure diligence with hand hygiene

POD 8:

- Patient confused/ hallucinating
- Vitals @ 3pm: HR 115, RR 18, SBP 89, T 35.3

Creating the Environment for AI Success

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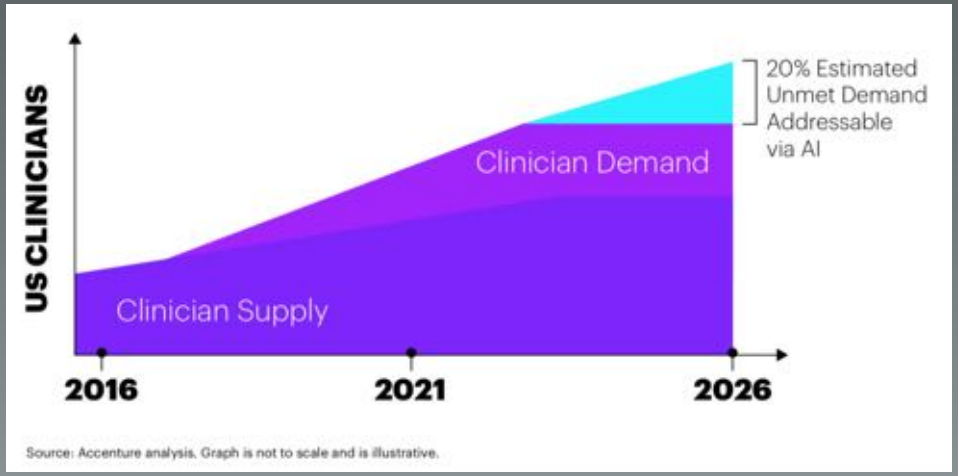
What Makes AI Work for Sepsis

Increased demands are driving an estimated **20%** of unmet clinical need



Target Population

- Patients who are at High/Med/Low risk of deteriorating toward sepsis
- Patients at risk for sepsis at admission in the ER or throughout the inpatient stay
- Patients who are not yet exhibiting clinical signs and symptoms

Target Impact

- Standard Interventions applied to all high risk patients to prevent septic shock and transition into ICU
- Individualized stack ranked interventions based patient-specific clinical and socioeconomic risk factors

AI Works Best When:

- There is an organizational goal to address a target event
- A process, the resources, and a program are already in place
- There is strong leadership support and alignment for adoption of an AI solution
- End-user/clinician engagement happens early
- Clear individual goals are established that are tied to adoption and use of the AI solution

Keys to Laying the Right Foundation for AI Success

When developing a plan and strategy for an AI implementation, you need to determine:

- Value and potential impact of the solution on patients
- Value and potential impact of the solution on the organization
- Impact of any clinical workflow adjustments needed
- Best stakeholders to include on the project team and to champion the AI tool going forward
- Strategic way to communicate metrics related to the AI solution and any success stories

What Makes AI Work for Sentara Healthcare

Mental Shift

- A mental shift towards pro-activeness, prevention, and hypervigilance

Organizational Goal

- An annual organizational goal supporting the adoption of the AI solution

Leadership

- Leadership alignment to that shared goal

Support

- Support resources available from internal project team

Operationalizing AI for Sepsis Care and Prevention—Sentara Case Study

Unlocking The Potential of Artificial Intelligence in Sepsis Care

About Sentara Healthcare

Sentara Healthcare is a not-for-profit system comprised of 12 acute care hospitals with more than 300 sites of care all throughout Virginia and northeastern North Carolina. For more than a decade, Modern Healthcare magazine has ranked Sentara as one of the nation's top integrated healthcare systems.

We're committed to creating a culture of innovation at Sentara. We encourage new ideas, embrace pilots and rapid cycle testing, and look for inspiration across all our regions, divisions and team members.

It's also not just about business; it's about our mission to improve health every day. In order to fulfill that mission, we must actively work to transform care and enhance our customer experience.

Sentara at a Glance

- Headquartered in Norfolk, Virginia
- 128-year not-for-profit history
- 12 hospitals
- 4 medical groups
- 3,800+ provider medical staff
- 28,000+ Members of the Team
- Health plan (Optima Health)
- Outpatient campuses
- Urgent care centers
- Advanced Imaging Centers
- Home health and hospice
- Rehab and therapy centers
- Nursing and assisted living centers
- Medical transport ambulance
- Nightingale air ambulance

AI Workflow Considerations – How We Deployed AI at Sentara

A design team consisting of clinical staff, IT support, and executive leads:

- Built an alert in the EMR to address high risk patients proposed by the AI machine
- Translated the AI proposed recommendations into actionable interventions
- Identified owners of those individual interventions and found pathways into their existing workflows
- Built order panels for MDs and RNs to order and send recommended interventions to the appropriate team

Example

- ***Increase pulmonary toileting*** will recommend the bronchial hygiene protocol by RT.
- ***Limit visitors with active cold, virus or other infectious symptoms*** will trigger order for Protective Isolation for the patient room.

AI Adoption Considerations

Data

- Importance of accurate clinical documentation
- Data structure in the EMR (importance of discrete data vs. text)
- Frequency of updates for risk propensity and interventions

Workflow

- Automation is key
- Use of alerts in EMR helps to streamline the workflow

Culture

- Is your company change adverse or technologically adverse?
- Do you have black-box skeptics?

Lessons Learned and Next Steps

Prior to Go-live

- Ensured frontline staff had clear vision of why the company is using AI
- Created a buzz around the new AI technology prior to launch
- Built strong communications plan to reach all nurses, providers, and other clinical staff impacted by the changes
- Built simple interventions through medical staff policy and protocol to minimize interruption of physician workflow
- Ensured that the orders for preventative interventions were introduced to the correct provider within their existing workflow
- Decided on phased roll-out strategy instead of system-wide big bang approach

Post Go-live

- Worked to improve utilization and of the AI tool and suggested workflows
- Managed expectations appropriately – radical change or success does not happen over night
- Continuous education to ensure end users understand the value of the AI tool

Q&A

Unlocking The Potential of Artificial Intelligence in Sepsis Care

Sepsis Awareness Month

SEPSIS ALLIANCE

- Launched in 2011 by Sepsis Alliance
- State designations
- Community events
- Sepsis Superhero™ Challenge
- Toolkits for healthcare providers
  - ➢Printable Posters and Infographics
  - ➢Digital and Social Media tools
  - ➢Ideas to get involved
  - ➢Template messaging

2019 SEPTEMBER SEPSIS SAY SEPSIS SAVE LIVES

SEPSISAWARENESSMONTH.ORG

Sepsis Heroes

SEPSIS ALLIANCE

- Annual celebration of sepsis leadership across the country
- September 12, 2019
- Marquee New York City

SEPSIS HEROES™

GE Sponsored Innovation Webinar

SEPSIS ALLIANCE

Series: Can We Help Solve Sepsis Together?

Augmented Intelligence for Healthcare and Sepsis

August 22 at 2-2:45 pm ET

Speaker:

Jeff Hersh, MD, PhD

Chief Medical Officer

GE Healthcare

Register at SepsisWebinar.org

Sepsis Alliance gratefully acknowledges the support provided for this webinar by GE Healthcare.

GE Healthcare

Sepsis Coordinator Network Webinar

SEPSIS ALLIANCE

Sepsis: Common, Lethal, and Unrecognized

August 27 at 2-3 pm ET

Speaker:

Angel O. Coz, MD, FCCP

Associate Professor of Medicine

University of Kentucky

Register at

SepsisCoordinatorNetwork.org

Founding Sponsor: Edwards

Network Sponsors: ACCELERATE DIAGNOSTICS, La Jolla Pharmaceutical, Beckman Coulter, Wolters Kluwer

Sepsis: Across the Continuum of Care Webinar

SEPSIS ALLIANCE

The Blind Spot of Antibiotic Stewardship: Antibiotic Overuse at Discharge

September 24 at 2-3 pm ET

Register at SepsisWebinar.org

Speaker:

Valerie Vaughn, MD, MSc

Assistant Professor

University of Michigan Medical School

Sepsis Alliance gratefully acknowledges the support provided for this webinar by Thermo Fisher Scientific.

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