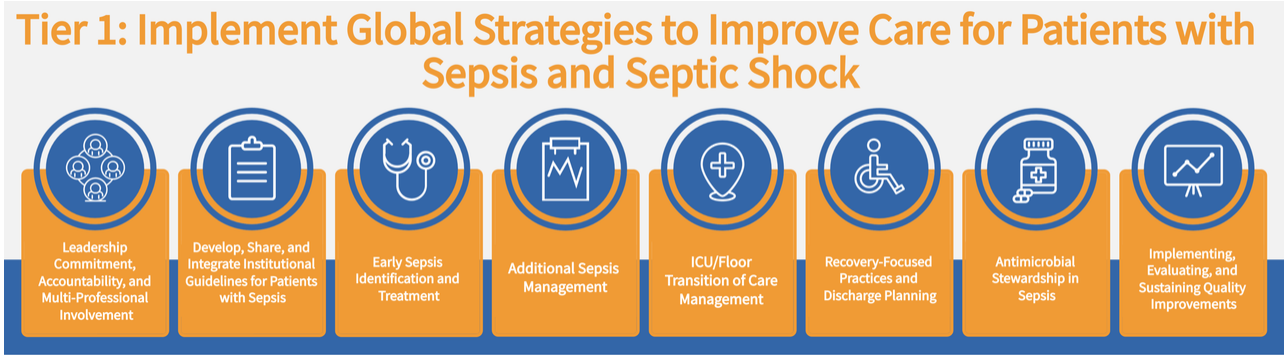
HMS Sepsis Toolkit



HMS
MICHIGAN HOSPITAL MEDICINE SAFETY CONSORTIUM

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This toolkit is a live document and will continually be updated as new tools are developed. Please visit the HMS website for the most up-to-date toolkit. If you have tools to be added to the toolkit, please see the HMS contact information below.

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1. Leadership Commitment, Accountability, and Multi-professional Involvement

Background, Rationale, and Suggested Implementation Strategies

Leadership Commitment/Accountability

- Perform sepsis program self-assessment to identify items that could improve the effectiveness of your sepsis program.
- Identify sepsis as a hospital priority and communicate this priority to hospital staff.
- Set ambitious but achievable goals for improving sepsis care and patient outcomes that are informed by review of hospital practices, hospital sepsis outcomes, and clinical practice guidelines.
- Assess progress towards hospital sepsis goals at regular intervals and update goals periodically (e.g., annually) to promote continual improvement.
- Identify a sepsis program leader (or two co-leaders) – ideally a nurse and a physician – who are responsible for sepsis program management and participate in sepsis-related performance evaluation and improvement activities.
- Appoint a senior administrator (e.g., Chief Clinical Officer, Chief Medical Officer, of Chief Nursing Officer) to serve as an executive sponsor for the sepsis program to ensure the program has resources and support needed to accomplish its mission. Have regular meetings with leaders of the sepsis program to assess the resources needed to accomplish the hospital's goals for sepsis activities and outcomes.
- Have a dedicated sepsis coordinator(s) to oversee the day-to-day implementation of the sepsis program activities. (see sample job description).
- Ensure team members have sufficient time to contribute to sepsis activities.
- Provide resources, including data analytics and information technology support, to operate the program effectively

Multi-professional Involvement:

- Assemble a multidisciplinary team including hospital sepsis program includes diverse multi-disciplinary representation (e.g., antimicrobial stewardship, critical care, emergency medicine, hospital medicine, infectious diseases, nursing, other primary services [e.g., surgery, oncology, obstetrics, pediatrics], pharmacy, and social work).
- Identify local/unit physician and nurse leaders and/or champions to ensure physician and nursing engagement and buy-in.

- Engage relevant support services – as necessary – from individuals with expertise and formal training in data management/analytics, information technology, and quality improvement/patient safety.

Resources

General Resources:

- CDC Hospital Sepsis Program Core Elements
  - Leadership Commitment: Hospital Sepsis Program Core Elements: | Infectious Diseases | CDC's Project Firstline | AMA Ed Hub (ama-assn.org)
- State of Michigan Certificate of Proclamation – September 2023 as Sepsis Awareness Month

Leadership Commitment/Accountability

- HMS Created - Sepsis Program Self-assessment Tool
- CDC Hospital Sepsis Program Core Elements Assessment Tool
- Sepsis Program Structure Examples:
- Michigan Medicine Sepsis Program Structure
- Henry Ford Health Sepsis Program Structure
- Sepsis Program Committee Structure Examples:
- Michigan Medicine – Sepsis Program Committee Structure
- Role of Executive Sponsor in Sepsis Quality Improvement

Multi-professional Involvement

- Quality Improvement Tools:
  - Agency for Healthcare Research and Quality - Quality Improvement (QI) Toolkit with Templates, Instructions, and Examples
  - England National Health Service (NHS) – Quality, Service Improvement and Redesign (QSIR) Tools
  - Health Quality British Columbia - BC Sepsis Network: Inpatient Sepsis Toolkit
- Sepsis Team Roles & Responsibilities:
  - Example – Adapted from Michigan Medicine
- Sepsis Coordinator Job Description:
  - Example – Adapted from Michigan Medicine
- HMS Sepsis Abstractor Job Description

Webinars

- Leadership Commitment: Hospital Sepsis Program Core Elements - A CDC Webinar Series (51:14)
  - **From:** CDC's Project Firstline
  - **Presenters:** Ray Dantes, MD, MPH; Jessie King, MD, PhD; Patricia Posa, RN, MSA; Hallie Prescott, MD, MSc
  - **CE Information:** 1.0 CME, 1.0 CPE, 1.0 CNE, 0.1 CEU, 1.0 CECH
  - **Session Overview:** CDC experts discuss the new Hospital Sepsis Program Core Elements and the importance of leadership commitment. During the webinar, CDC partners share real-life examples, strategies, and best practices to help organizations successfully implement the new core elements, with a focus on dedicating the necessary human, financial, and information technology resources.
- Accountability and Multi-professional Expertise: Hospital Sepsis Program Core Elements - A CDC Webinar Series (54:00)51
  - **From:** CDC's Project Firstline
  - **Presenters:** Ray Dantes, MD, MPH; Hallie Prescott, MD, MSc; Colleen Drolett, MBA, RN; Isabel Friedman, DNP, RN; Nicholas Kuhl, MD, FACEP
  - **CE Information:** 1.0 CME, 1.0 CNE, 1.0 CPE, 0.1 CEU, 1.0 CECH
  - **Session Overview:** CDC subject matter experts and partners explore the importance of appointing a leader responsible for program outcomes, the benefits of setting concrete program goals and how to engage key partners throughout the organization.
- Creating Pockets of Excellence: Improving Sepsis Programs Through Multi-Disciplinary Collaboration and Physician Champions (57:46)
  - **From**: Sepsis Alliance Institute
  - **Presenters**: Michelle Evans, RN, MSN, NP-C – Sepsis Program Coordinator; Michael Chandler, MD – Medical Director; Quentin Reuter, MD- Clinical Decision Unit Medical Director; Cameron McCorcle, MD – Residency Physician Champion; & Gwen Hughes, MD Critical Care Hospitalist.
  - **CE Information:** 1.7 CNE, 1.25 CE for other healthcare professionals
  - **Session Overview:** In this live webinar, presenters discuss how such a multi-disciplinary healthcare team approach can ensure coordinated, high-quality care and can improve sepsis bundle compliance, patient outcomes, and staff satisfaction.
- Building ROI for Your Sepsis Program: Key Considerations for People, Process, and Technology (27:10)
  - **From**: Sepsis Alliance Institute

    - **Presenter**: Itay Klaz, MD, MCHI
    - **Session Information:** Calculating ROI, specifically for sepsis performance, can be complex. In this sponsored webinar, learners explore key considerations for building the ROI for their sepsis programs and investments, and discuss how changes in people, process, and technology can drive improved sepsis outcomes.
- Sepsis Champions: How Hospital-wide Involvement Changes Sepsis Care (52:46)
    - **From**: Sepsis Alliance Institute
    - **Presenters**: Lily Popkin, MSN, RN, CEN & Frankie Hamilton, MSN, MBA, RN, CCRN-K, PCCN -K, CNML
    - **CE Information:** 1.6 CNE, 1.25 CE for other healthcare professionals
    - **Session Information:** A step by step process for creating a sepsis champion program is reviewed including getting started, building momentum, defining role, and sustainment strategies.
- Multi-disciplinary Healthcare Team Engagement, Education, and Empowerment: The Key Ingredients to a Sustainable Sepsis Program (58:42)
    - **From:** Sepsis Alliance Institute
    - **Presenters:** Gabriel Wardi, MD, MPH, FACEP & Kristin Bray, RN, MAS
    - **CE Information:** 1.7 RN CEs, 1.25 for other health care professionals
    - **Session Information:** This educational webinar discusses key strategies for engaging and empowering the multi-disciplinary healthcare team in your sepsis program. Additionally, this presentation reviews novel strategies for educating frontline providers and encouraging multi-disciplinary teamwork.
- Health in Action Workgroup
    - **From:** Michigan Value Collaborative (MVC)
    - **Presenters:** Tami Garcia, MSN, RN, Sepsis Process Lead; Carly Redstone, RN, MSN, Adult Hospitals Quality Specialist and AES Sepsis Coordinator; Rosalie Mulcahy, RN, BSN, PCCN, Adult Hospitals Quality Specialist and Inpatient Sepsis Coordinator
    - **Session Information:** In honor of Sepsis Awareness Month, join MVC for a workgroup presentation about the Michigan Medicine Quality Department's sepsis management approach.

References

- Advancing Quality Alliance. Improving the treatment of sepsis and reducing variation. *NHS Health Education England* 2018.
    - Improved treatment of sepsis and reduced variation through identifying resources, leadership engagement, use of data, PDCA, adopting best practice and use of digital technology
- Damiani, E. et al. Effect of Performance Improvement Programs on Compliance with Sepsis Bundles and Mortality: A Systematic Review and Meta-Analysis of Observational Studies. *PLOS One* 2015.
    - Performance improvement programs are associated with increased adherence to resuscitation and management sepsis bundles and with reduced mortality in patients with sepsis, severe sepsis, or septic shock
- Dantes, R. et al. Sepsis Program Activities in Acute Care Hospitals – National Healthcare Safety Network, United States, 2022. *CDC MMWR* 2023.
    - Findings from the 2022 NHSN annual survey evaluating the prevalence and characteristics of sepsis programs in acute care hospitals highlighted opportunities to improve the care and outcomes of patients with sepsis in the United States. It is suggested this can be done by ensuring that all hospitals have sepsis programs with protected time for program leaders, engagement of medical specialists, and integration with antimicrobial stewardship programs.
- Goddard, C. Advancing Quality Alliance – Improving Care for Patients with Sepsis in an Acute Trust. *NHS Advancing Quality Programme* 2021.
    - Demonstrated improve care and outcomes through leadership engagement, pathway redesign, use of data and communication.
- Hughes, M. et al. A Quality Improvement Project to Improve Sepsis-Related Outcomes at an Integrated Healthcare System. *Journ for Healthcare Qual* 2019.
    - A retrospective analysis examined data (n = 4,475) from three health systems to better determine the impact of a 10-month sepsis quality improvement program that consisted of clinical alerts, audit and feedback, and staff education. Compared with the control group, the intervention group significantly decreased length of stay and costs per stay. The intervention group increased sepsis bundle compliance by more than 40%. A sepsis quality improvement program may improve sepsis health outcomes and decrease costs.
- Naya, K. et al. Implementation of a nurse-led multidisciplinary huddle meeting for improvement of early rehabilitation in ICU: a healthcare quality improvement project. *BMJ Open Quality* 2023.

    - According to this protocol, a nurse-led 'multidisciplinary rehabilitation huddle meeting' was introduced for early rehabilitation. Rehabilitation status, muscle strength and physical function were compared 9 months before and after the introduction of the huddle meeting. In addition, we assessed adverse events during rehabilitation. Since the introduction of huddle meetings, the implementation rate has been 100%. This quality improvement project facilitated an earlier start to rehabilitation and a higher level of rehabilitation practice.
- Thursky, K. et al. Implementation of a whole of hospital sepsis clinical pathway in a cancer hospital: impact on sepsis management, outcomes and costs *BMJ Open Quality* 2018.
    - Implementation of a hospital clinical pathway for the management of sepsis was associated with significant improvement in patient outcomes and reduced costs.

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2. Develop, Share, and Integrate Institutional Guidelines for Patients with Sepsis

Background, Rationale, and Suggested Implementation Strategies

<u>Developing Institutional Guidelines</u>

- Develop institutional guidelines, locally adapted from national and example hospital guidelines, for identification and treatment of sepsis. If institution specific guidelines already exist, they should comply with the following:
    - *Hospital onset sepsis - Institutional guidelines should include:*
        - *Standardized process for screening for sepsis upon presentation and throughout hospitalization*
        - *Clinical evaluation (labs, diagnostic studies, imaging etc.)*
        - *Antimicrobial selection*

    - *Source control*
    - *Fluid resuscitation (indications, contraindications, type, and volume of fluid)*
    - *Antimicrobial narrowing and stopping*
    - *Patient and family education on sepsis*
    - *Peri-discharge management*
- Integrate recommendations into key processes within the healthcare system such as into order sets, individual orders, discharge planning/processes, required yearly education for staff, etc.

<u>Guideline Implementation - Order Sets and Screening Processes</u>

- Develop and implement order sets for management of sepsis
- Develop and implement sepsis screening process for early identification of sepsis upon presentations and throughout hospitalization.
- Explore training rapid response teams in sepsis recognition and care.
- Develop structures and processes to facilitate prompt delivery of antimicrobials.
- Develop a standardized process for sepsis management including:
    - Screening
    - Clinical evaluation
    - Diagnosis
    - Antimicrobial selection
    - Source control
    - Fluid resuscitation
    - Indications for treatment escalation
    - Antimicrobial narrowing and stopping
    - Patient and family/caregiver education
    - Peri-discharge management

<u>Guideline Implementation - Multidisciplinary Handoffs & Discharge Practices</u>

- Develop structures and processes to support effective hospital hand-offs in patients with sepsis.
- Develop processes to evaluate patients prior to discharge and refer to appropriate resources post discharge to support recovery from sepsis.

<u>Guideline Implementation - Educating Providers and Patients/Families</u>

- Educate providers, including hospitalists, internal medicine, family medicine, emergency medicine physicians, residents, advanced practice professionals (APPs), and nursing staff about sepsis, early identification, sepsis management, their role in team-based sepsis care and post sepsis syndrome.

- Provide written and verbal education on sepsis to patients and families. Education should include: what is sepsis, increased risk for subsequent episodes of sepsis, when to suspect sepsis, when to seek evaluation for potential sepsis and post sepsis syndrome.
- During educational sessions, highlight HMS data, showing opportunities for improvement.
- Communicate and promote institution-specific guidelines with frontline providers, including physicians, APPs, nursing, and pharmacy to ensure use of recommendations (morning report, grand rounds, medical staff meetings, division meetings).
- Build systems that can help modify provider behavior. Examples include (but are not limited to): clinical decision support tools.
- Consider social factors in marketing guidelines to frontline providers. Highlight their participation in creation of the guidelines, and try to overcome viewpoints of loss of provider autonomy. Instead, emphasize improvement in quality and outcomes.
- Involve champions in the education and dissemination process.

Resources

Examples of Guidelines that could be locally adapted to your institution based on local needs, antibiograms, etc.:

- International Guidelines:
  - Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2021. Critical Care Medicine.
  - Surviving Sepsis Early Identification of Sepsis on the Hospital Floors
  - Australian Commission on Safety and Quality in Healthcare – Sepsis Clinical Care Standard (2022)
- HMS Member Hospital Examples:
  - University of Michigan Health West Sepsis Algorithm Example
  - Corewell Health – Spectrum: Clinical Pathway – Sepsis, Severe Sepsis and Septic Shock (Adult Inpatient)
  - Henry Ford Health – Suggested Empiric Antibiotic Therapy Guidelines
- Other Institutional Guideline Examples:
  - Intermountain Healthcare Recognition and Management of Severe Sepsis and Septic Shock

- University of Wisconsin Sepsis: Diagnosis and Management – Adult – Inpatient/Emergency Department Clinical Practice Guideline
- University of Nebraska Medical Center Antibiotic Recommendations for Sepsis & Septic Shock

Implementation Resources

- Society of Critical Care Medicine Diagnostic Excellence Program – Implementing the Hour-1 Bundle Using a Multiprofessional Approach
- State of Victoria, Australia – Implementing an Adult Sepsis Pathway Toolkit

Webinars

- Action: Hospital Sepsis Program Core Elements - A CDC Webinar Series (57:53)
  - **From:** CDC's Project Firstline
  - **Presenters:** Ray Dantes, MD, MPH; Hallie Prescott, MD, MSc; Megan Cahill, DO, FACOEP; Errin Couck, BSN, RN; Michael W. Fill, DO, FACEP
  - **CE Information:** 1.0 CME, 1.0 CNE, 1.0 CPE, 0.1 CEU, 1.0 CECH
  - **Session Overview:** CDC experts and partners share insights on how to implement effective structures and processes to improve sepsis identification, management, and recovery.
- Education: Hospital Sepsis Program Core Elements - A CDC Webinar Series
  - **From:** CDC's Project Firstline
  - **Presenters:** Ray Dantes, MD, MPH; Hallie Prescott, MD, MSc
  - **CE Information:** TBD
  - **Session Overview:** Discover the impact of sepsis education for healthcare professionals during onboarding and as an annual refresher.
- Data and Quality Initiatives: Addressing a Costly and Deadly Condition (44:21)
  - **From**: Sepsis Alliance Institute
  - **Presenters**: Hallie Prescott, MD, MCs; Scott Flanders, MD; Amy McKenzie, MD, MBA; John Syrjamaki, MPH.
  - **Session Overview:** This panel discussion reviews assay biological pathways, sepsis progression, and immune system collapse. It will explore the role of molecular diagnostics in sepsis workflow and how to implement effective sepsis protocols in the lab and hospital practice.
- Developing Systems for Rural Sepsis Care (54:33)
  - **From:** Sepsis Alliance Institute
  - **Presenter:** Nicholas Mohr, MD, MS
  - **CE Information:** 1.6 CNE, 1.25 CE for other healthcare professionals

    - **Session Overview:** This presentation will explain some of the barriers to sepsis care and the ways that systems of care can be developed to support rural patients in low-volume hospitals.
- Strategies for Improving Sepsis Care (53:43)
    - **From:** Sepsis Alliance Institute
    - **Presenter:** Kelly Nguyen, MSN, RN, PHN
    - **CE Information:** 1.6 CNE, 1.25 CE for other healthcare professionals
    - **Session Overview:** This training module is intended to help staff functioning in quality/performance improvement roles begin the process of sepsis quality improvement for their organizations.

Order Sets Examples

- Munson Hospital – Sepsis Order Set
- Munson Cadillac Hospital – Sepsis Positive Screening Nursing Orders
- Henry Ford Health: ED Sepsis Narrator
- Henry Ford Health: Early Treatment – Code Sepsis and Sepsis Narrator
- Example of Severe Sepsis Alert with SBAR Embedded

Handoff Examples (to be locally adapted by your institution based on local needs, antibiograms, etc.)

- Health Services Advisory Group – Post-Acute SBAR for Sepsis (for when a patient screens positive for sepsis)
- Premier Health Atrium Medical Center – Sepsis Hand Off Tool
- Australian Commission on Safety and Quality in Healthcare – SHARED Clinical Handover Poster
- Society of Hospital Medicine Learning Portal – HQPS Transitions of Care Series Learning Modules (Free)
- AHRQ – SBAR Tool
- AHRQ – I-PASS Tool
- The Joint Commission – 8 Tips for High Quality Hand-offs
- AHA Center for Health Innovation TeamSTEPPS – What is SBAR?
- AHA Center for Health Innovation TeamSTEPPS – Video Example of SBAR
- AHA Center for Health Innovation TeamSTEPPS – Video Example of IPASS Handoff

Healthcare Professional Educational Resources

- BMJ Best Practice: Sepsis in Adults
- CDC's *Get Ahead of Sepsis (GAOS)* Healthcare Professional Information

- The Sepsis Alliance Institute Webinars
- End Sepsis Resources
- Continulus Pocketbook of Sepsis
- Think Sepsis
- SSC Adult Patients Resources | SCCM
- World Sepsis Day Pocket Cards for Medical Professionals (and other Resources)
- Surviving Sepsis Campaign: Guidance on the Guidelines and Bundle (video)
- Surviving Sepsis Campaign: The Hour One Bundle (video)
- Surviving Sepsis Campaign: Hour One Bundle Infographic and Pocket Card[MOU4] [SK5]

Patient, Family, and Caregiver Resources

- CDC's *Get Ahead of Sepsis (GAOS)* Patient Information
  - Emphasizes the importance of early recognition, timely treatment, reassessment of antibiotic needs, and prevention of infection.
- Sepsis Alliance Patient & Family Page
- Sepsis Alliance Virtual Connect Support Community
- International Sepsis Forum Brochure on: What is Sepsis?
- Michigan Medicine COVID-19 Caregivers Toolkit
- Henry Ford Health Sepsis Fact Sheet for Patients
- World Sepsis Day Pocket Cards for General Public

References

- Alberto, L. et al. Screening for sepsis in general hospitalized patients: a systematic review. *J Hosp Infect* 2017.
  - A systematic review of literature which found that paper-based, nurse-led screening tools for sepsis appear to be more sensitive in the identification of septic patients.
- Dale, C. et al. Order set usage is associated with lower hospital mortality in patients with sepsis. *Crit Care Explorations* 2023.
  - A retrospective, observational cohort study which found that the use of a sepsis order set ("Sepsis Management" order) was independently associated with lower hospital mortality in patients hospitalized with sepsis.
- Damiani, E. et al. Effect of performance improvement programs on compliance with sepsis bundles and mortality: a systematic review and meta-analysis of observational studies. *PLoS One* 2015.

    - Performance improvement programs are associated with increased adherence to resuscitation and management sepsis bundles and with reduced mortality in patients with sepsis, severe sepsis, or septic shock.
- Dooley, K. et al. Improving hospital sepsis care using PAs and NPs on a rapid response team. *JAAPA* 2022
    - Using a sepsis rapid response team with physician associates/assistants (PAs) and NPs improved hospital adherence to sepsis evaluation and order set use from 48% to 86%.
- Ju, T. et al. Sepsis Rapid Response Teams *Crit Care Clin* 2018 .
    - Using hospital-wide initiatives consisting of multidisciplinary education, training, and specific resource utilization, such teams have been found to improve patient outcomes for patients at risk of having or who have sepsis.
- Tarabichi, Y. et al. Improving Timeliness of Antibiotic Administration Using a Provider and Pharmacist Facing Sepsis Early Warning System in the Emergency Department Setting: A Randomized Controlled Quality Improvement Initiative* *Crit Care Med 2022.*
    - Display of an electronic health record–based sepsis early warning system–triggered flag combined with electronic health record–based pharmacist notification was associated with shorter time to antibiotic administration without an increase in undesirable or potentially harmful clinical interventions.
- Threat. D.L., et al. Improving sepsis bundle implementation times: A nursing process improvement apprach. *Nursing Care Qual* 2020.
    - A Performance Improvement project focusing on implementing an ER Nurse Sepsis Identification Toolk, leadership buy-in, and SIRS education led to a decrease in time to bundle compliance in the ED.
- Thursky, K. et al. Implementation of a whole of hospital sepsis clinical pathway in a cancer hospital: impact on sepsis management, outcomes and costs *BMJ Open Quality* 2018.
    - Implementation of a whole hospital clinical pathway for the management of sepsis was associated with significant improvement in patient outcomes and reduced costs.

3. Early Sepsis Identification and Treatment

Background, Rationale, and Suggested Implementation Strategies

Early Identification (HMS Bundle Measures)

- Initial lactate resulted within 3 hours of arrival to hospital/emergency department
- Repeat lactate resulted within 4 hours of first lactate (if elevated)
- Blood culture collected within 3 hours of arrival (non-viral sepsis only)
- Blood culture collected before antibiotic administration

Initial Treatment (HMS Bundle Measures)

- Antibiotic delivered within 5 hours (if not hypotensive) for non-viral sepsis
- **Antibiotic delivered within 3 hours of arrival if hypotensive for non-viral sepsis (HMS 2024 Performance Measure)**

Fluid Management (HMS Bundle Measures)

- ≥30 ml/kg ideal body weight (IBW) fluid within 6 hours, if indicated
  - If not indicated, documentation as why this decision was made.
- ≥30 ml/kg IBW fluid within 2 hours of vasopressor initiation

Steps to Achieve Above Measures

- Sepsis team to review current performance with each component, review opportunities for improvement, identify gaps and understand root causes for gaps. Implement action items to mitigate root causes identified.
- Educate providers (attending, residents, APP, and nursing staff) on sepsis and evidenced based interventions. Develop ongoing education plan for each discipline.
- Provide audit and feedback directly to teams regarding compliance with bundles.
- Consider implementing a “Code Sepsis” or sepsis huddle to facilitate early sepsis recognition and treatment.
- To improve time to antibiotic consider stocking common antimicrobials in non-pharmacy locations (ED, floor, ICU); make first antibiotic STAT on all order sets and engage pharmacy in the sepsis response.

- Walk your process in ED, floor, and ICUs to identify areas of opportunity, understand issues and barriers
- Educate providers and nurses on the importance of early fluids and its impact on outcomes.

Resources

General

- HMS site reports (hard copy distributed at collaborative wide meetings and live reports available daily via the HMS data entry system)

Early Identification - Badge Cards & Checklists

- Michigan Medicine Sepsis Treatment Bundle Badge Card
- Sepsis Alliance Badge Buddy
- Corewell Health Pocket Card – Know the Symptoms of Sepsis
- Michigan Medicine Severe Sepsis Checklist
- Munson Cadillac Hospital Sepsis and Septic Shock Checklist
- Licking Memorial Hospital – ED Sepsis Checklist

Early Identification - Screening Tool Examples

- Clinical Excellence Commission – New South Wales, Australia: Adult Sepsis Pathway
- Surviving Sepsis Campaign: Severe Sepsis Screening Tool
- University of Nebraska Medical Center Sepsis Identification worksheet
- Henry Ford Health Sepsis Screening Policy
- American Nurse – Sepsis Tracking Sheet

Early Identification - Code Sepsis Examples

- Henry Ford Health Example Policy

Early Identification - Technology-based Resources

- Surviving Sepsis App
- Queensland Government - Sepsis: Early Recognition Screensaver
- Corewell Health Sepsis Program Build (EPIC)
- Sepsis Prediction Model for Determining Sepsis vs SIRES, qSOFA, and SOFA

Early Identification - Other Tools/Resources

- NSW Government Clinical Excellence Commission – Information for Clinicians: Lactate in the Deteriorating Patient

Initial Treatment - Infographics

- Surviving Sepsis: Antibiotic Timing Infographic
- Surviving Sepsis Hour-1 Bundle Poster and Pocket Card

Initial Treatment - Pathways and Tracking Tools

- AHRQ: Best Practices in the Diagnosis and Treatment of Sepsis – PowerPoint and Facilitator Guide
- Safer Care Victoria Example Sepsis Pathway (Page 7)

Fluid Management Resources

- Video: IV Fluid Resuscitation in Septic Shock
- SCCM: Application of Fluid Resuscitation in Adult Septic Shock

Webinars

- Sepsis Alliance Institute - Nurses Suspect Sepsis (20:23)
  - **From:** Sepsis Alliance Institute
  - **Session Overview:** This video discusses the importance of suspecting sepsis in patients, and reviews cases of potential patients with sepsis.
- Sepsis Alliance Institute – Sepsis: Common, Lethal, and Unrecognized (58:32)
  - **From:** Sepsis Alliance Institute
  - **Presenter:** Angel Coz, MD, FCCP
  - **CE Information:** 1.7 CNE, 1.25 CE for other healthcare professionals
  - **Session Overview:** This webinar discusses sepsis recognition and early management of sepsis. Sepsis treatment and improvement in delivery of care for disease specific populations are presented. Emerging severe sepsis prediction algorithms and the impact on patient survival and hospital length of stay are described.
- Sepsis Alliance Institute – Standardizing Sepsis Care for Optimal Outcomes
  - **From:** Sepsis Alliance Institute
  - **Presenters:** Angel Coz, MD, FCCP; Mary Ann Barnes-Daly, MS, RN, CCRN-K, DC
  - **CE Information:** 1.6 CNE, 1.25 CE for other healthcare professionals
  - **Session Overview:** This presentation will describe and provide supporting data for the improvement efforts from two distinct health systems. Presenters

will discuss the steps undertaken by a large Northern California health system to improve process and outcomes for the care of patients with severe sepsis and septic shock, and examine several VA Medical Centers' general sepsis management experiences. Work of both healthcare systems emphasizes the importance of recognition of sepsis as a medical emergency and structured sepsis management.

- Sepsis Alliance Institute – Sepsis 101 for Nurses (1:31:20)
  - **From:** Sepsis Alliance Institute
  - **Presenter:** Kelly Nguyen, MSN, RN, PHN
  - **CE Information:** 2.3 CNE, 1.9 CE for other healthcare professionals
  - **Session Overview:** This webinar discusses the need for basic sepsis education. Nurses are often the first to notice changes in a patient's signs and symptoms that may indicate the development of sepsis, and the need to have ongoing access to accurate sepsis education.
- Sepsis Alliance Institute – Sepsis for the Advanced Practice Provider (57:02)
  - **From:** Sepsis Alliance Institute
  - **Presenters:** Sue Sirianni, RN, DNP, ACNP-BC, ANP-BC, CCRN; Maria Teresa Palleschi, DNP RN APRN-BC CCRN
  - **CE Information:** 1.7 CNE, 1.25 CE for other healthcare professionals
  - **Session Overview:** Sepsis continues to be one of the main causes of morbidity and mortality in the adult population throughout the world. The session will review the epidemiology, pathophysiology and how advanced practice providers (APP) can impact the 3 and 6 hour bundle through the use of evidence based practices. It will also discuss how genotype affects sepsis identification, treatment and outcomes.

References

Early Identification

- Bhattacharjee, P. et al. Identifying Patients with Sepsis on the Hospital Wards. *Chest* 2017.
  - Data highlighting the benefits and limitations of the systemic inflammatory response syndrome (SIRS) criteria for screening patients with sepsis, such as its low specificity, as well as newly described scoring systems, including the proposed role of the quick sepsis-related organ failure assessment (qSOFA) score.

- Chen, H. et al. Early lactate measurement is associated with better outcomes in septic patients with an elevated serum lactate level. *Crit Care* 2019.
    - A strong relationship between delayed initial lactate measurement and risk-adjusted 28-day mortality was noted. Further analysis demonstrated that repeating the measurement 3 h after the initial lactate measurement led to a significant difference.
- Delawder, J.M. et al. An Interdisciplinary Code Sepsis Team to Improve Sepsis-Bundle Compliance: A Quality Improvement Project. J Emerg Nurs. Jan 2020;46(1):91-98.
    - Interprofessional teams can use existing knowledge, skills, and tools to improve sepsis-bundle compliance and mortality outcomes in patients with sepsis presenting to the emergency department.
- Scheer, C.S. et al. Impact of antibiotic administration on blood culture positivity at the beginning of sepsis: a prospective clinical cohort study. *Clin Microbiol Infect* 2019.
    - Obtaining blood cultures during antibiotic therapy is associated with a significant loss of pathogen detection. This strongly emphasizes the current recommendation to obtain blood cultures before antibiotic administration in patients with sepsis.
- Schorr, C. et al. Implementation of a multicenter performance improvement program for early detection and treatment of severe sepsis in general medical-surgical wards. *J Hosp Med* 2016.
    - Based on our experience, we recommend a stepwise approach to implement such a program to improve outcomes and sustain improvements.
- Uffen, J.W. et al. Interventions for rapid recognition and treatment of sepsis in the emergency department: a narrative review. *Clin Microbiol Infect* 2021.
    - The severity and poor outcome of sepsis as well as the frequency of its presentation in EDs make a structured, protocol-based approach towards these patients essential, preferably as part of a clinical pathway.

<u>Initial Treatment</u>

- Ballester, L. et al. Differences in Hypotensive vs. Non-Hypotensive Sepsis Management in the Emergency Department: Door-to-Antibiotic Time Impact on Sepsis Survival. *Med Sci (Basel)* 2018.
    - Initial management of patients with community-onset severe sepsis differed according to their clinical presentation. Initial hypotension was associated with early hemodynamic management and less ICU requirement. A non-significant delay was observed in the administration of antibiotics to initially

non-hypotensive patients. The time of door-to-antibiotic administration was related to mortality.

- Liu, V.X. et al. Multicenter Implementation of a Treatment Bundle for Patients with Sepsis and Intermediate Lactate Values. *Am J Resp Crit Care Med* 2016.
  - Multicenter implementation of a treatment bundle for patients with sepsis and intermediate lactate values improved bundle compliance and was associated with decreased hospital mortality.
- Liu, V.X. et al. The timing of early antibiotics and hospital mortality in sepsis. *Am J Respir Crit Care Med* 2017.
  - In a large, contemporary, and multicenter sample of patients with sepsis in the emergency department, hourly delays in antibiotic administration were associated with increased odds of hospital mortality even among patients who received antibiotics within 6 hours.
- Peltan, I.D. et al. ED Door-to-Antibiotic Time and Long-term Mortality in Sepsis. *Chest* 2019.
  - Delays in ED antibiotic initiation time are associated with clinically important increases in long-term, risk-adjusted sepsis mortality.
- Prescott, H.C. et al. Temporal trends in antimicrobial prescribing during hospitalization for potential infection and sepsis. *JAMA IM* 2022.
  - In this multihospital cohort study, the time to first antimicrobial for sepsis decreased over time, but this trend was not associated with increasing antimicrobial use, days of therapy, or broadness of antimicrobial coverage, which suggests that shortening the time to antibiotics for sepsis is feasible without leading to indiscriminate antimicrobial use.
- Seymour, C.W. et al. Time to treatment and mortality during mandated emergency care for sepsis. *New Engl J Med* 2017.
  - More rapid completion of a 3-hour bundle of sepsis care and rapid administration of antibiotics, but not rapid completion of an initial bolus of intravenous fluids, were associated with lower risk-adjusted in-hospital mortality. (Funded by the National Institutes of Health and others).
- Taylor, S.P. et al. First-to-second antibiotic delay and hospital mortality among emergency department patients with suspected sepsis *Am J Emerg Med* 2021.
    - First-to-second antibiotic delay of greater than one hour was associated with an increased risk of hospital death among patients meeting criteria for septic shock but not all patients with suspected sepsis. Tracking and improving first-to-second antibiotic delays may be considered in septic shock.

Early Fluid Management

- Acharya, P. et al. Fluid resuscitation and outcomes in heart failure patients with severe sepsis or septic shock: A retrospective case-control study. *PLoS One* 2021.
  - The use of ≥30 mL/Kg fluid bolus seems to confer protection against in-hospital mortality and is not associated with increased chances of mechanical ventilation in heart failure patients presenting with severe sepsis or septic shock.
- Kuttab, HI. et al. Evaluation and predictors of fluid resuscitation in patients with severe sepsis and septic shock. *Crit Care Med* 2019.
  - Failure to reach 30 ml/kg/hr by 3 hours of sepsis onset was associated with increased odds of in-hospital mortality irrespective of comorbidities. Predictors of inadequate resuscitation can be identified, potentially leading to interventions to improve survival.
- Meyhoff, T.S. et al. Restriction of Intravenous Fluid in ICU Patients with Septic Shock *New England Journal of Medicine* 2022.
  - Among adult patients with septic shock in the ICU, intravenous fluid restriction did not result in fewer deaths at 90 days than standard intravenous fluid therapy.
- Zampieri, F.G. et al. Fluid Therapy for Critically Ill Adults with Sepsis. *JAMA* 2023.
  - Fluids are an important component of treating patients who are critically ill with sepsis. Although optimal fluid management in these patients remains uncertain, clinicians should consider the risks and benefits of fluid administration in each phase of critical illness and facilitate fluid removal for patients recovering from acute respiratory distress syndrome.

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4. Additional Sepsis Management

Background, Rationale, and Suggested Implementation Strategies

HMS Bundle Measures in Data Reports

- Use of norepinephrine as first-line vasopressor

- Use of adjunctive steroids in septic shock
- Use of balanced solutions (e.g., Lactated Ringers) over other fluids
- Antibiotics delivered in recommended sequence
- Initial antibiotic delivered within 1 hour of order
- Lung protective ventilation strategy used (if mechanically ventilated)

Strategies to Achieve Bundle Measures

- Sepsis team to review current performance with each component, identify gaps and understand root causes for gaps. Implement action items to mitigate root causes identified.
- Educate providers (attending, residents, APP, and nursing staff on why sepsis and evidenced based interventions-include key research studies supporting interventions. Develop ongoing education plan for each discipline
- Provide audit and feedback directly to teams regarding compliance with bundles

Resources

Use of Norepinephrine as First-Line Vasopressor

- Surviving Sepsis Campaign Vasopressor Infographic
- European Society of Intensive Care Medicine – Vasopressor Management in Septic Shock: General Overview and Personalized Approaches (Video)

Use of Adjunctive Steroids in Septic Shock

- Emergency Medicine Residents Association - Steroid Use in Septic Shock Infographics

Use of Balanced Solutions (e.g., Lactated Ringers) Over Other Fluids

- McLaren Greater Lansing Balanced Fluids Poster

Antibiotics Delivered in Recommended Sequence

- Ohio Hospital Administration: Sepsis Antibiotic Administration

Lung Protective Ventilation Strategy Used

- AHRQ Toolkit to Improve Safety for Mechanically Ventilated Patients
- Society of Hospital Medicine: Mechanical Ventilation Part I: The Basics
- Society of Hospital Medicine: Mechanical Ventilation Part II: Beyond the Basics

- Educational series designed for Hospitalists and ICU providers

References

Use of Norepinephrine as First-Line Vasopressor

- Avni, T. et al. Vasopressors for the treatment of septic shock: Systematic review and meta-analysis. *PLoS One* 2015.
  - Evidence suggests a survival benefit, better hemodynamic profile and reduced adverse events rate for norepinephrine over dopamine. Norepinephrine should be regarded as the first line vasopressor in treatment of septic shock.
- Cardenas-Garcia, J. et al. Safety of Peripheral Intravenous Administration of Vasoactive Medication. *J of Hosp Med* 2015.
  - Administration of norepinephrine, dopamine, or phenylephrine by peripheral intravenous access was feasible and safe in this single-center medical intensive care unit. Clinicians should not regard the use of vasoactive medication is an automatic indication for central venous access.
- De Backer, D. et al. Comparison of dopamine and norepinephrine in the treatment of shock. *N Engl J Med* 2010.
  - The use of dopamine as first-line vasopressor agent was associated with a greater number of adverse events than the use of norepinephrine.
- Permpikul, C. et al. Early Use of Norepinephrine in Septic Shock Resuscitation (CENSER). A Randomized Trial *Am J Respir Crit Care Med* 2019.
  - Early norepinephrine was significantly associated with increased shock control by 6 hours.

Use of Adjunctive Steroids in Septic Shock

- Bosch, N. et al. Comparative Effectiveness of Fludrocortisone and Hydrocortisone vs. Hydrocortisone Alone Among Patients With Septic Shock. *JAMA* 2023.
  - Among patients with septic shock receiving norepinephrine who initiated hydrocortisone treatment, the addition of fludrocortisone was associated with lower rates of the composite of death or discharge to hospice compared with hydrocortisone alone.
- Fang, F. et al. Association of Corticosteroid Treatment with Outcomes in Adult Patients with Sepsis: A Systematic Review and Meta-Analysis. *JAMA IM* 2019.

    - This systematic review and meta-analysis of 37 randomized clinical trials suggests that administration of corticosteroid treatment in patients with sepsis is associated with significant improvement in health care outcomes and thus with reduced 28-day mortality.
- Rygård, S.L. et al. Low-dose corticosteroids for adult patients with septic shock: A systematic review with meta-analysis and trial sequential analysis. *Intensive Care Med* 2018.
    - In adults with septic shock treated with low dose corticosteroids, short- and longer-term mortality are unaffected, adverse events increase, but duration of shock, mechanical ventilation and ICU stay are reduced.

Use of Balanced Solutions (e.g., Lactated Ringers) Over Other Fluids

- Bledsoe, J. et al. Order Substitutions and Education for Balanced Crystalloid Solution Use in an Integrated Health Care System and Association With Major Adverse Kidney Events *JAMA Network Open* 2022.
    - In this study, an implementation program in a large integrated health care system was associated with an increase in the proportion of balanced crystalloids received among patients in the emergency department and hospital settings and was associated with a reduction in major adverse kidney events.
- Brown, R.M. et al. Balanced Crystalloids versus Saline in Sepsis. A Secondary Analysis of the SMART Clinical Trial *Am J Respir Crit Care Med* 2019.
    - Demonstrates that use of balanced crystalloids was associated with a lower 30-day in-hospital mortality compared with use of saline.
- Hammond, N.E. et al. Balanced Crystalloids versus Saline in Critically Ill Adults — A Systematic Review with Meta-Analysis *NEJM Evid* 2022.
    - The estimated effect of using balanced crystalloids versus saline in critically ill adults ranges from a 9% relative reduction to a 1% relative increase in the risk of death, with a high probability that the average effect of using balanced crystalloids is to reduce mortality.
- Jackson, K.E. et al. Effect of early balanced crystalloids before ICU admission on sepsis outcomes. *Chest* 2021.
    - Among patients with sepsis, the effect of balanced crystalloids vs. saline on mortality was greater among patients for whom fluid choice was controlled starting in the ED compared with starting in the ICU.
- Rochwerg, B. et al. Fluid Resuscitation in Sepsis: A systematic review and network meta-analysis. *Annals of Internal Medicine* 2014

    - Demonstrates that among patients with sepsis, resuscitation with balanced crystalloids or albumin compared with other fluids seems to be associated with reduced mortality.
- Zampieri, F.G. et al. Association between Type of Fluid Received Prior to Enrollment, Type of Admission, and Effect of Balanced Crystalloid in Critically Ill Adults: A Secondary Exploratory Analysis of the BaSICS Clinical Trial *Am J Respir Crit Care Med* 2022.
    - Demonstrates a high probability that balanced solution use in the ICU reduces 90-day mortality in patients who exclusively received balanced fluids before trial enrollment.

Antibiotics Delivered in Recommended Sequence

- Amoah, et al. Administration of a β-Lactam Prior to Vancomycin as the First Dose of Antibiotic Therapy Improves Survival in Patients with Bloodstream Infections. *Clin Infec Dis* 2022.
    - Prioritizing administration of a β-lactam over vancomycin may reduce early mortality, underscoring the significant impact of a relatively simple practice change on improving patient survival.
- Strich, J.R. et al. Considerations for empiric antimicrobial therapy in sepsis and septic shock in an era of antimicrobial resistance. *Journ Infect Dis* 2020.
    - Hospitals should have a performance improvement program to reduce the time from initial patient presentation to the administration of appropriate therapy for all patients who meet the screening definition of sepsis. An essential education element for nurses is the order of administration of antibiotics for sepsis. β-lactam antibiotics should be administered first before MRSA coverage given the broader spectrum activity and shorter infusion times for initial dosing.

Lung Protective Ventilation Strategy Used

- Angus, D. et al. Caring for Patients With Acute Respiratory Distress Syndrome: Summary of the 2023 ESICM Practice Guidelines *JAMA* 2023.
    - Summary of the 2023 ESICM Practice Guidelines.
- Neto, A.S. et al. Chapter 6 – Ventilatory Support of Patients with Sepsis or Septic Shock in Resource-Limited Settings. *Sep Man Res Lim Set* 2019.
    - This chapter reviews recommendations on the identification of patients with ARDS, indications for mechanical ventilation, and strategies for lung-protective ventilation in resource-limited settings.

- Neto, A.S. et al. Association between use of lung-protective ventilation with lower tidal volumes and clinical outcomes among patients without acute respiratory distress syndrome: A meta-analysis. *JAMA* 2012.
    - This analysis found evidence that a ventilation strategy using lower tidal volumes is associated with a lower risk for developing ARDS. Furthermore, the strategy was associated with lower mortality, fewer pulmonary infections, and less atelectasis when compared with higher tidal volume ventilation in patients without lung injury at the onset of ventilation.

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5. ICU/Floor Transition of Care Management

Background, Rationale, and Suggested Implementation Strategies

HMS Bundle Measures in Data Reports

- Temporary CVC removal prior to transfer out of ICU
- Temporary CVC removal or documentation of need to keep prior to transfer out of ICU
- Urinary catheter removal prior to transfer out of ICU
- Urinary catheter removal or documentation of need to keep prior to transfer out of ICU
- Communication of volume status at ICU transfer
- Communication of antibiotic plan at ICU transfer
- Discontinuation or non-use of controlled substances at ICU transfer
- Delirium assessment at ICU transfer and in ward

Strategies to Achieve these Measures

- Sepsis team to review current performance with each component, identify gaps and understand root causes for gaps. Implement action items to mitigate root causes identified.

- Develop structures and processes to support effective hospital hand-offs in patients with sepsis

Resources

- ATS ICU PAUSE Tools - The ICU Pause program aims to educate health care providers around patient safety and equity in diagnosis at the time of ICU discharge.
  - Informational Packet
  - Sample ICU to Ward dotphrase (EPIC)
  - Print Ready Flyer
  - ICU PAUSE Instructional Video
  - ICU Pause Example Implementation in Electronic Documentation
- AHRQ Playbook for Preventing CLABSI and CAUTI in the ICU Setting
  - Example of a Nurse-Driven Protocol for Urinary Catheter Removal
  - Intensive Care Unit Infographic Poster
- CDC Presentation: Maintenance and Removal of Central Venous Catheters
- AHRQ Medications at Transitions and Clinical Handoffs (MATCH) Toolkit for Medication Reconciliation
- HMS Antibiotic Time Out Check List
- HQPS Transitions of Care Series
  - SHM series features three transitions of care subtopics that will describe various types of transitions of care with respective best practices.
- Open Critical Care: ICU Rounding Daily Check List
- Example Electronic Transfer Tool Sections and Screenshots
- OSF St. Francis – Admission and Discharge Criteria: Critical Care Services
- ICU Liberation Bundle ICU Liberation Bundle (A-F) | SCCM | SCCM
  - ICU Liberation A-F Bundle Overview (sccm.org)
  - Assessment tools:
    - Critical Care Pain Observation Tool (SCCM)
    - Enlarged Pain Numeric Rating Scale (SCCM)
    - Richmond Agitation-Sedation Scale (SCCM)
    - Confusion Assessment Method for the ICU (CAM-ICU) Flowsheet (SCCM)
- SCCM ICU Liberation Collaborative Team Gap Analysis

References

- Chopra, V. et al. Michigan Appropriateness Guide for Intravenous Catheters (MAGIC) *Ann Intern Med*. 2015
  - Guide and decision-making support for venous access devices.
- ICU Transfer Summary Consensus Panel. Identifying essential elements to include in Intensive Care Unit to hospital ward transfer summaries: A consensus methodology *Journ of Crit Care* 2019.
  - Panel identified 63 distinct information elements identified as essential for inclusion in an ICU transfer summary tool to facilitate communication between providers during the transition of patient care from the ICU to a hospital ward.
- Leigh, J.P. et al. Effectiveness of an Electronic Communication Tool on Transitions in Care From the Intensive Care Unit: Protocol for a Cluster-Specific Pre-Post Trial *Journal of Critical Care* 2020.
  - This study adds to the current literature on the effect of computerized tools on reducing communication breaks between the ICU and other PCUs during transitions in care and to ultimately improve patient safety.
- Lekshmi, S. et al. Cocreating the ICU-Pause Tool for Intensive Care Unit-Ward Transitions. *ATS Scholar* 2022.
  - Group created a novel, more user-friendly electronic ICU–ward transfer tool, ICU-PAUSE, alongside Internal Medicine trainees.
- Lekshmi, S. et al. Characterising ICU-ward handoffs at three academic medical centres: process and perceptions *BMJ Qual Saf* 2019.
  - In this multisite study, despite significant process variation across sites, almost all resident physicians recalled an adverse event related to the ICU-ward handoff. Future work is needed to determine best practices for ICU-ward handoffs at academic medical centers.
- Pun, B.T. et al. Caring for Critically Ill Patients with the ABCDEF Bundle: Results of the ICU Liberation Collaborative in Over 15,000 Adults. *Crit Care Med* (2019).
  - ABCDEF bundle performance showed significant and clinically meaningful improvements in outcomes including survival, mechanical ventilation use, coma, delirium, restraint-free care, ICU readmissions, and post-ICU discharge disposition.
- Saint, S. et al. Enhancing the Safety of Critically Ill Patients by Reducing Urinary and Central Venous Catheter-related Infections *Am J Respir Crit Care Med* 2002.

    - Evidence based overview of preventative measures both for CVCs and Urinary Catheter infections.
- Starmer, A. et al. Changes in medical errors after implementation of a handoff program. *N Engl J Med* 2014.
    - Implementation of the handoff program was associated with reductions in medical errors and in preventable adverse events and with improvements in communication, without a negative effect on workflow.

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6. Recovery-Focused Practices and Discharge Planning

Background, Rationale, and Suggested Implementation Strategies

HMS Bundle Measures on Data Reports - Recovery Practices

- Baseline functional status was assessed (≥4 I/ADLs documented)
- PT/OT consultation
- Assessment and documentation of goals of care

HMS Bundle Measures on Data Reports - Discharge Planning

- Post-discharge phone call made to patient within 3 calendar days
- Anticipatory guidance for symptom monitoring
- Hospital contact provided for issues post discharge
- Scheduled for PCP follow-up within 2 weeks
- Appropriate continuation of medications for chronic disease management on discharge
- Appropriate discontinuation/non-use of controlled substances on discharge

Strategies to Achieve Measures

- Implement practices to reduce post sepsis and post ICU syndrome

- Sepsis team evaluates current state of discharge process and recovery focused practices
- Consider implementing Project RED discharge process

Resources

General

- HMS site reports (hard copy distributed at collaborative wide meetings and live reports available daily via the HMS data entry system)

Recovery-Focused Practices

- The Hospital + Health System Association of Pennsylvania Suite of Sepsis Fact Sheets
  - Patient Post-Discharge
  - Patient Post-Discharge Action Plan
  - Patient Discharge Checklist-For Staff Discharging a Sepsis Patient
  - Patient and Family Education
  - Hand-Off Communication – Acute Care Hospital to Post-Acute Care Facility
  - Health Care Providers
  - Post-Acute Care Facilities
  - Home Care Staff
- AHRQ: Care Transitions from Hospital to Home: IDEAL Discharge Planning Implementation Handbook
  - This resource is designed to help hospitals develop effective partnerships with patients and family members with the goal of improving multiple aspects of hospital quality and safety.
- Michigan Medicine COVID-19 Resources for Patients and Families

Baseline Functional Status Assessment

- Geriatric Assessment Toolkit – Functional Status Questionnaire
- North East Specialized Geriatric Centre – Baseline Functional Status Fact Sheet and Example Assessment
- University of Michigan – Geriatric Functional Assessment

PT/OT Consultation

- AHRQ – Tool 3K: Algorithm for Mobilizing Patients

Assessment/Documentation of Goals of Care

- CAPC: Honoring Previously Determined Preferences for Care
- POLST Conversations for ED Physicians with a Capable Patient
  - From: The Center to Advance Palliative Care
  - This five-minute video demonstrates a physician talking with a capable patient about wishes for care and treatment.
- Key Elements of a Goals of Care Discussion (Dunlay, S.M. et al, *Trends in Cardiovascular Medicine*)
- SPIKES Framework for Approaching Difficult Conversations with Patients

Discharge Planning

- Henry Ford Health Sepsis: Patient Education Guide
- UpToDate: Hospital Discharge and Readmission
- Project RED (Re-Engineered Discharge): Toolkit (bu.edu)
- Patient Education: AHRQ. Taking Care of Myself: A Guide for when I leave the hospital
- Life After Sepsis Guide for Sepsis Survivors and Families
- Society of Critical Care Medicine Patient and Family Resources
- Queensland Health Adult Sepsis Patient Discharge Information
- JAMA Patient Page on Post sepsis Morbidity
- SCCM – Recovery After a Hospitalization for Sepsis (Video)
- Indiana Patient Safety Center – IHA Sepsis Patient and Family Discharge Education

HMS Collaborative-Wide Meeting Resources (Authentication May Be Required)

- HMS Sepsis Abstractor Breakfast Education Session (July 2023) – Optimizing Transition for Sepsis Patients (Speaker: Pat Posa, RN, BSN, MSA, CCRN-K, FAAN)
- October 10, 2020, HMS/MHA Sepsis Symposium – Post-Hospital Management

Post-Discharge Phone Call Made to Patient within 3 Calendar Days

- Project Re-Engineered Discharge (RED) – How to Conduct a Post-Discharge Follow Up Phone Call
- AHRQ Post Discharge Follow-up Phone Call Script
- University of Michigan-West Transition of Care Phone Call Documentation Template (for EPIC)

- Discharge Checklist and Follow-up Phone Calls: The Foundation to an Effective Discharge Process; Parker Adventist Hospital Presentation
- Kentucky Hospital Association – Post Discharge Follow-Up Call Script

Hospital Contact Provided for Issues Post-Discharge

- IMPACT – Reduce Readmissions with 3 Simple Items When Discharging to a SNF
- Sepsis Alliance Hospital Discharge List – Post-Sepsis or Septic Shock
- AHRQ Re-Engineered Discharge Toolkit – Components of After Hospital Care Plan (AHCP)
- UpToDate – Ideal Discharge of the Older Adult Patient: A Hospital Checklist
- HMS Member Hospital Examples

Scheduled for PCP Follow-Up with 2 Weeks

- IMPACT – Physician Conversation Guide: Scheduling 7-day Follow-up Appointments
- The University of Kansas Health System: Ready, Set, CALL: Improving Follow-Up Appointments Post Hospital Discharge (Examples of Discharge Checklist and Appointment Order Set)
- AHRQ – Discharge Process Checklist
- IMPACT Patient Conversation Guide: Do you want to avoid another hospital stay? (EN)
    - IMPACT Patient Conversation Guide: Do you want to avoid another hospital stay? (SP)

Appropriate Continuation of Medications on Discharge

- Take Care Network – My Medication Log (for patients)
- National Transition of Care Coalition – Medication Reconciliation Elements

Appropriate Discontinuation/Non-Use of Controlled Substances on Discharge

- Society of Hospital Medicine Implementation Guide – Improving Pain Management for Hospitalized Medical Patients

Webinars

- Communicating with Sepsis Patients: A Survivor's Story (53:22)
    - **From:** Sepsis Alliance Institute
    - **Presenters:** Angel Coz, MD, FCCP; Darrell Raikes
    - **CE Information:** 1.6 CNE, 1.25 CE for other healthcare professionals

    - **Session Overview:** Hear firsthand from Darrell Raikes, a sepsis survivor and 2019 Erin Kay Flatley Spirit Award Winner, as he discusses his 32-day ICU stay and ensuing recovery. Participants will learn about post-sepsis physical, cognitive, and emotional challenges faced by many sepsis survivors. A Critical Care specialist will review the importance of early sepsis recognition to improve patient outcomes.
- Transitions of Care: Out of the Hospital
    - **From:** Society of Hospital Medicine (SHM)
    - **Presenters:** Amit Bansal, MD, MBA, CPE, FHM; Amy Baughman, MD, MPH; Catherine Lau, MD; Nidhi Rohatgi, MD, MS, FACP, FHM
    - **CE Information:** 0.25 CE for healthcare professionals
    - **Session Overview:** This series will feature three transitions of care subtopics that will describe various types of transitions of care with respective best practices.
- Empowering Sepsis Survivors: Developing Patient & Family Education and Discharge Plans (1:00:58)
    - **From:** Sepsis Alliance Institute
    - **Presenters:** Stephanie Parks Taylor, MD, MS; Sandra Kleier, RN; Don Smith; Kaitlin Walden
    - **CE Information:** 1.7 CNE, 1.25 CE for other healthcare professionals
    - **Session Overview:** During this presentation, participants will learn about the long-term outcomes and risks faced by sepsis survivors. Additionally, there will be information on strategies and resources for championing best practice, evidence-based discharge planning, and education protocols for sepsis survivors and their families.
- Transitions of Care After Sepsis Hospitalization (57:15)
    - **From:** Sepsis Alliance Institute
    - **Presenter:** Stephanie Parks Taylor, MD, MS
    - **CE Information:** 1.7 CNE, 1.25 CE for other healthcare professionals
    - **Session Overview:** Dr. Stephanie Parks Taylor addresses what is known about the post-acute care needs of sepsis survivors and discuss evidence-based approaches to meet these needs.
- Enhancing Recovery from Sepsis and COVID-19 (55:13)
    - **From:** Sepsis Alliance Institute
    - **Presenter:** Hallie Prescott, MD, MSc
    - **CE Information:** 1.6 CNE, 1.25 CE for other healthcare professionals
    - **Session Overview:** This webinar reviews the current understanding of long-term outcomes from sepsis, reviews best practices for enhancing recovery

from sepsis, and discusses current trials underway to enhance recovery from sepsis.

- Improving Sepsis Survivorship: A Multidisciplinary Approach to Optimize Post-Sepsis Care (59:51)
  - **From:** Sepsis Alliance Institute
  - **Presenters:** Jakob McSparron, MD; Rima Mohammad, PharmD; Mari Pitcher, MSW, MBA
  - **CE Information:** 1.7 CNE, 1.25 CE for other healthcare professionals
  - **Session Overview:** This course discusses a multidisciplinary approach for the care of patients after hospitalization for sepsis and is presented by the clinicians working at the Michigan Medicine UM PULSE (Post-ICU Longitudinal Survivor Experience) Clinic. Learn the resources you need to care for sepsis survivors and delve into the value brought by the interdisciplinary clinical team to improve sepsis survivorship and quality of life.
- Post-Sepsis Syndrome: Recognition and Management (56:03)
  - **From:** Sepsis Alliance Institute
  - **Presenters:** Cairn Ruhumuliza, RN, MS, CPHQ; Catherine (Terri) Hough, MD, MSc
  - **CE Information:** 1.6 CNE, 1.25 CE for other healthcare professionals
  - **Session Overview:** This webinar reviews signs and symptoms of post-sepsis syndrome and their relationship to sepsis and identify how to determine a post-sepsis patient's pre-sepsis function and goals of care.
- Caring for Sepsis Survivors (57:47)
  - **From:** Sepsis Alliance Institute
  - **Presenter:** Hallie Prescott, MD, MSc
  - **CE Information:** 1.7 CNE, 1.25 CE for other healthcare professionals
  - **Session Overview:** This presentation revies best practices to mitigate and/or recover from post-sepsis sequelae, as well as reviews discharge and post-discharge medical care to enhance survivorship.
- Sepsis and Opioid Use Disorder: The Intersection of Two Public Health Crises (58:56)
  - **From:** Sepsis Alliance Institute
  - **Presenters:** Simeon Kimmel, MD, MA; Chanu Rhee, MD, MPH, FIDSA
  - **CE Information:** 1.6 CNE, 1.25 CEs for other healthcare providers
  - **Session Overview:** Sepsis and opioid use disorders are major sources of morbidity, mortality, and costs to the healthcare system. While most of the national focus has been on the rising number of fatal opioid overdoses, less attention has been paid to the serious infectious complications of opioid use

disorders, including sepsis. In this presentation, Drs. Rhee and Kimmel will review recent data elucidating the epidemiology of sepsis and opioid-related hospitalizations and discuss potential strategies for reducing the harms associated with the intersection of these two public health emergencies.

References

Baseline Functional Status Assessment

- Iwashyna, T.J. et. al. Long-term cognitive impairment and functional disability among survivors of severe sepsis. *JAMA* 2010
  - Severe sepsis in this older population was independently associated with substantial and persistent new cognitive impairment and functional disability among survivors. The magnitude of these new deficits was large, likely resulting in a pivotal downturn in patients' ability to live independently.
- Odden, A.J. et al. Functional outcomes of general medical patients with severe sepsis. *BMC Infec Dis* 2013.
  - New physical debility is a common feature of severe sepsis in patients initially cared for on the general medical floor. Debility occurs even in those with good baseline physical function. Interventions to improve the poor functional outcomes of this population are urgently needed.

PT/OT Consultation

- Rousseau, A.F. et al. Long-term Outcomes After Critical Illness: Recent Insights. *Crit Care* 2021.
  - This article summarized the benefits of a variety of interventions on post-intensive care syndrome (PICS) and the long-term health status of ICU survivors. One intervention outlined is promoting exercise in these patients.
- Sakai, Y. et al. Effects of Early Rehabilitation in Sepsis Patients by a Specialized Physical Therapist in an Emergency Center on the Return to Activities of Daily Living Independence: A Retrospective Cohort Study . *PloS One* 2022.
  - This study investigated how early rehabilitation provided by a specialized physical therapist affects ADL in patients with sepsis. Assigning a specialized physical therapist to sepsis patients at an advanced emergency critical care center significantly shortened the number of days until a patient can begin rehabilitation after hospital admittance and improved activities of daily living after hospital discharge.

- Schweickert, W.D. et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomized controlled trial. *Lancet* 2009.
    - A strategy for whole-body rehabilitation – consisting of interruption of sedation and physical and occupational therapy in the earliest days of critical illness – was safe and well tolerated and resulted in better functional outcomes at hospital discharge, a shorter duration of delirium, and more ventilator-free days compared with standard care.
- Sossdorf, M. et al. Potential Effect of Physiotherapeutic Treatment on Mortality Rate in Patients with Severe Sepsis and Septic Shock: A Retrospective Cohort Analysis. *Journal of Critical Care* 2013.
    - The aim of the study was to examine the onset and frequency of physiotherapeutic interventions (PTI) and their potential effects on the intensive care unit mortality rate in patients with severe sepsis or septic shock. This study found that the frequency of PTI was associated with improved outcomes.
- Uthup, B.R. et al. Evaluating the benefits of early intensive rehabilitation for patients with sepsis in the medical intensive care unit: A retrospective study. *Journ Acute Care PT* 2021.
    - Patients who received early rehabilitation intervention in the MICU had significantly higher level of mobility at discharge and a better discharge disposition than those who received a standard rehabilitation intervention.
- Walsh, T.S. et al. Increased Hospital-Based Physical Rehabilitation and Information Provision After Intensive Care Unit Discharge: The RECOVER Randomized Clinical Trial. *JAMA Intern Med* 2015.
    - In a randomized clinical trial at two hospitals in Scotland, 240 patients who received at least 48 hours of mechanical ventilation while hospitalized received a variety of interventions, including physiotherapy. Post-ICU hospital-based rehabilitation, including increased physical and nutritional therapy plus information provision, did not improve physical recovery or health related quality of life, but improved patient satisfaction with many aspects of recovery.

<u>Assessment of Goals of Care</u>

- Bernacki, R.E. et al. Communication About Serious Illness Care Goals: A Review and Synthesis of Best Practices. *JAMA Internal Medicine* 2014.
    - This article (1) reviews the evidence and describes best practices in conversations about serious illness care goals and (2) offers practical advice for clinicians and health care systems about quality and timing of such communication. The authors conclude that communication about serious

illness care goals is an intervention that should be systematically integrated into our clinical care structures and processes.

- Black, M.D. et al. A Multifaceted Intervention to Improve Compliance with Process Measures for ICU Clinician Communication with ICU Patients and Families. *Critical Care Medicine* 2013.
  - This study found that a multifaceted intervention to improve communications between families and clinicians in the ICU improved compliance with process measures.
- Curtis, J.R. et al. Intervention to Promote Communication About Goals of Care for Hospitalized Patients with Serious Illness. *JAMA* 2023.
  - Among hospitalized older adults with serious illness, a pragmatic clinician facing communication-priming intervention significantly improved documentation of goals of care discussions, with a greater effect size in racially or ethnically minoritized patients.
- Dunlay, S. et al. How to Discuss Goals of Care with Patients. *Trends in Cardiovascular Medicine* 2016.
  - This framework is meant to enable clinicians to feel impowered to discuss goals of care with their patients. These conversations are essential to aligning care delivery with patient preferences.
- Pronovost P, et al. Improving communication in the IC using daily goals. *Journ of Crit Care* 2003.
  - Implementation of a daily goals form resulted in a significant improvement in the percent of residents and nurses who understood the goals of care for the day and a reduction in ICU length of stay.

General Discharge Planning

- Becker, C. et al. Interventions to Improve Communication at Hospital Discharge and Rates of Readmission: A Systematic Review and Meta-analysis. *JAMA Netw Open* 2021.
  - Communication interventions at discharge are significantly associated with fewer hospital readmissions, higher treatment adherence, and higher patient satisfaction and thus are important to facilitate the transition of care.
- Chao, P. et al. Association of Postdischarge rehabilitation with mortality in intensive care unit survivors of sepsis. *Am J Respir Crit Care Med* 2014.
  - Post-discharge rehabilitation may be associated with a reduced risk of 10-year mortality in the subset of patients with particularly long ICU courses.
- Kowalkowski, M.A. et al. Effect of a transitional care intervention on rehospitalization and mortality after sepsis: A 12-month follow-up of a

randomized clinical trial. *Am J Resp Crit Care Med*
    - Details the 12-month outcomes of a randomized clinical trial demonstrating that proactive and sepsis-specific multicomponent transitional support improved 30-day outcomes after sepsis hospitalization.
- Prescott, H.C. et al. Enhancing Recovery from Sepsis: A Review. *JAMA* 2018.
    - In the months after hospital discharge for sepsis, management should focus on (1) identifying new physical, mental, and cognitive problems and referring for appropriate treatment, (2) reviewing and adjusting long-term medications, and (3) evaluating for treatable conditions that commonly result in hospitalization, such as infection, heart failure, renal failure, and aspiration. For patients with poor or declining health prior to sepsis who experience further deterioration after sepsis, it may be appropriate to focus on palliation of symptoms.
- Prescott, H.C. et al. Readmission diagnoses after hospitalization for severe sepsis and other acute medical conditions. *JAMA 2015.*
    - Readmissions within 90 days after hospitalization for severe sepsis were common, and 42% occurred for diagnoses that could potentially be prevented or treated early to avoid hospitalization. The high prevalence and concentration of specific diagnoses during the early post discharge period suggests that further study is warranted of the benefit of post discharge interventions.
- Taylor, S.P. et al. Clinical Subtypes of Sepsis Survivors Predict Readmission and Mortality after Hospital Discharge. *Ann Am Thorac Soc*. 2022.
    - Sepsis survivors constitute distinct clinical subtypes and future interventions may be targeted to the unique needs of each subtype.
- Trivedi, S.P. et al. Assessment of Patient Education Delivered at the time of Hospital Discharge. *JAMA* 2023.
    - In this QI study, patients infrequently received discharge education in key domains, leaving gaps in patient knowledge. Interventions to improve the hospital discharge process should address the content, method of delivery, and transparency among team members regarding patient education.

<u>Post-Discharge Phone Call Made to Patient within 3 Calendar Days</u>

- Dudas, V. et al. The impact of follow-up telephone calls to patients after hospitalization. *Am J Med* 2001.
    - A follow-up phone call by a pharmacist involved in the hospital care of patients was associated with increased patient satisfaction, resolution of

medication-related problems, and fewer return visits to the emergency department.

- Jack, B.W. et al. A re-engineered hospital discharge program to decrease rehospitalization: a randomized trial. *Ann Intern Med* 2009.
  - A package of discharge services reduced hospital utilization within 30 days of discharge. These discharge services included a nurse discharge advocate working with patients during hospitalization to facilitate discharge planning and a follow-up call from a clinical pharmacist post-discharge to reinforce discharge plan.
- Taylor, S.P. et al. Effect of a Multicomponent Sepsis Transition and Recovery Program on Mortality and Readmissions After Sepsis: The Improving Morbidity During Post-Acute Care Transitions for Sepsis Randomized Clinical Trial. *Crit Care Med* 2022.
  - Patients provided a 30-day program using a nurse navigator to provide best practices for post-sepsis care experienced a lower proportion of either mortality or rehospitalization within 30 days after discharge.

Hospital Contact Provided for Issues Post-Discharge

- Harrison, J.D. et al. Developing a Patient and Family-Centered Research Agenda for Hospital Medicine: The Improving Hospital Outcomes through Patient Engagement (i-HOPE) Study. *J Hosp Med* 2020.
  - A group of patients, caregivers, healthcare providers, and researchers from 39 organizations identified questions that were high priority to improve care of hospitalized adult patients. Knowing who to call if there are questions/issues post-discharge was identified as a high-priority issue.

Scheduled for PCP Follow-Up Within 2 Weeks

- Coppa, K. et al. Examination of Post-discharge Follow-up Appointment Status and 30-Day Readmission *J Gen Intern Med* 2021.
  - The benefit of patients arriving to their post-discharge appointments compared with patients who missed their follow-up visits or had no follow-up scheduled, is only significant during first week post-discharge, suggesting that coordination within 1 week of discharge is critical in reducing 30-day readmissions.
- Misky, G.J. et al. Post-hospitalization Transitions: Examining the Effects of Timing of Primary Care Provider Follow-up. *J Hosp Med* 2010.
  - Patients admitted to a Colorado hospital that did not have timely follow-up with their primary care provider were 10 times more likely to be readmitted to

the hospital than those who did receive timely follow-up with their PCP.

- Prescott, H.C. et al. Variation in Scheduling and Receipt of Primary Care Follow-up After Hospitalization for COVID-19 in Michigan. *J Gen Intern Med* 2021.
  - In a cohort of patients discharged alive from hospitalization during wave 1 of COVID-19 at 38 hospitals across Michigan, only 9 percent were scheduled for follow-up within 14 days of discharge. During wave two of COVID-19, only 25% were scheduled for a 14-day follow-up prior to discharge. At both timepoints, scheduling practices varied widely across hospitals. Enhanced policies and programs to facilitate post-hospitalization follow-up appear necessary.
- Shen, E. et al. Association of a Dedicated Post–Hospital Discharge Follow-up Visit and 30-Day Readmission Risk in a Medicare Advantage Population *JAMA Intern Med* 2017.
  - Any follow-up visit with a primary care clinician within 7 days of discharge was associated with a lower risk for 30-day readmission for patients on the medicine service.

Appropriate Continuation of Medications on Discharge

- Bell, C.M. et al. Discontinuity of Chronic Medications in Patients Discharge from the Intensive Care Unit. *J Gen Intern Med.* 2006.
  - Patients discharged from the ICU often leave the hospital without note of their previously prescribed chronic medications. Careful review of medication lists at ICU discharge could avoid potential adverse outcomes related to unintentional discontinuation of chronic medications at hospital discharge.
- Coleman, E.A. et al. Posthospital medication discrepancies: Prevalence and contributing factors. *JAMA IM* 2005.
  - A total of 14.1% of studied patients (community-dwelling adults aged 65 and older) experienced one or more medication discrepancies between what older patients reported taking post discharge in comparison with their prehospital medication regimen. Both patient-associated and system-associated solutions may be needed to ensure medication safety during the discharge process.
- Pronovost, P. et al. Medication reconciliation: A practical tool to reduce the risk of medication errors. *J of Crit Care* 2003.
  - Estimates reveal that 46% of medication errors occur on admission or discharge from a hospital when patient orders are written. Use of a medication reconciliation discharge survey in an adult surgical ICU resulted in a dramatic drop in medication errors for patients discharged from the ICU.

Appropriate Discontinuation/Non-Use of Controlled Substances on Discharge

- Delaney, L. et al. Opioid and benzodiazepine prescribing after COVID-19 hospitalization. *J of Hosp Med* 2022.
    - In the studied cohort of patients across hospitals in Michigan, new exposure to opioids and/or benzodiazepines is common and discharge prescriptions are correlated with inpatient admission. Future efforts should aim to ensure that discharge prescriptions adhere to best practices in safe opioid stewardship, and that strong care transitions with consistent follow-up are prioritized.

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7. Antimicrobial Stewardship in Sepsis

Background, Rationale, and Suggested Implementation Strategies

- Involve Antimicrobial Stewardship teams and/or Infectious Disease physicians, pharmacists, and nurses in Sepsis committees/workgroups at your local institution.
- Identify local/unit lead for sepsis-related antimicrobial stewardship improvement efforts. This person would be responsible for ensuring implementation of interventions recommended by the sepsis committee/workgroup, as well as identifying and troubleshooting barriers noted during implementation.
- Meet quarterly to review data, define problem areas, identify underlying causes, and determine interventions for improvement related to antimicrobial stewardship in sepsis.
- Communicate antimicrobial stewardship work to local leadership to ensure institutional buy-in.
- When implementing antibiotic stewardship interventions consider using behavioral economics techniques: in other words, make the right thing easier (e.g., automatic) and the wrong thing harder (e.g., removing from order sets).
- Assess post-intervention data for impacts of the intervention, modify intervention as needed.
- Encourage documentation of dose, indication, and duration of antibiotics in daily progress notes

- Utilize antibiotic time outs, including:
  - Assess indication(s) for antibiotics
  - Review culture results
  - De-escalate or discontinue antibiotics based on culture results, clinical stability
  - If ongoing antibiotics, consider switching to oral route of administration
  - If ongoing antibiotics, decide and document treatment duration
- Engage infectious disease consultation teams early in sepsis management.
- Engage pharmacists to review culture data and tailor antibiotic plan to individual patient
- Ensure all days of antibiotic therapy (including intravenous therapy) are included when determining ongoing duration of antibiotic therapy

Recommendations from CDC Core Elements of Antimicrobial Stewardship on Sepsis Interventions

- Develop antibiotic recommendations for sepsis that are based on local microbiology data
- Ensuring protocols are in place to administer antibiotics quickly in cases of suspected sepsis
- Ensure there are mechanisms in place to review antibiotics started for suspected sepsis so that therapy can be tailored or stopped if deemed unnecessary

Resources

- Best Practices in the Diagnosis and Treatment of Sepsis (AHRQ - Slide Set and Facilitator Guide)
- CDC Core Elements of Hospital Antibiotic Stewardship Programs
  - Notable element: "There have been some misperceptions that antibiotic stewardship may hinder efforts to improve the management of sepsis. However, rather than hindering effective patient care, antibiotic stewardship programs can play an important role in optimizing the use of antibiotics, leading to better patient outcomes."
- CDC Implementation of Antibiotic Stewardship Core Elements at Small and Critical Access Hospitals
- National Quality Partners Playbook: Antibiotic Stewardship in Acute Care

- Henry Ford: Antimicrobial Stewardship Transition of Care Resource/Gap Analysis Tool
- Intermountain Healthcare: Quick Reference Guide for Hospital Pharmacists on De-escalation
- HMS Antibiotic Time Out Checklist
- CDC Poster – Healthcare Professionals: Be Antibiotics Aware at Hospital Discharge

Webinars

- The Diagnostic Role in AMR (35:00)
  - **From:** Sepsis Alliance Institute
  - **Presenter:** Edward Septimus, MD, FIDSA, FACP, FSHEA
  - **CE Information:** 1.0 CNE, 0.75 CE for other healthcare professionals
  - **Session Overview:** In this session, the presenter will review diagnostic stewardship and its importance for limiting the spread of AMR and optimizing patient outcomes.
- Antimicrobial Stewardship and Management of Sepsis: Two Sides of the Same Coin (55:35)
  - **From:** Sepsis Alliance Institute
  - **Presenter**: Nikunj Vyas, PharmD, BCPS (Clinical Pharmacist/Infectious Diseases)
  - **CE Information**: 1.6 CNE, 1.25 CE for other healthcare professionals
  - **Session Overview:** This presentation will describe the role of antimicrobial stewardship in management of sepsis and areas of opportunity to potentiate this interdependent relationship between them.
- Understanding the Role and Principles of Antimicrobial Stewardship (35:00)
  - **From:** Sepsis Alliance Institute
  - **Presenter**: Nikunj Vyas, PharmD, BCPS (Clinical Pharmacist/Infectious Diseases)
  - **CE Information**: 1.0 CNE, 0.75 CE for other healthcare professionals
  - **Session Overview:** This presentation will discuss the purpose of implementing an in-hospital ASP and discuss interventions that can be applied to improve antibiotic use, limiting AMR. Opportunities for how to align and integrate hospital sepsis programs with the ASP will also be discussed.
- Antibiotic Stewardship and Sepsis: A Balancing Act (55:48)
  - **From:** Sepsis Alliance Institute
  - **Presenter**: George Sakoulas, MD (Infectious Diseases) & Sarah Kabbani, MD, MSc (CDC, Infectious Diseases)

    - **CE Information**: 1.6 CNE, 1.25 CE for other healthcare professionals
    - **Session Overview:** This webinar presents an overview of antibiotic stewardship and recent research regarding antibiotic treatments and sepsis care. Strategies to prevent antibiotic resistance and provide optimal care for sepsis patients are discussed. The CDC's latest guidance and new research on antibiotic stewardship is presented. Antibiotic stewardship program experience in hospital settings is shared. Session was recorded on 12/9/2019.
- The Blind Spot of Antibiotic Stewardship: Antibiotic Overuse at Discharge (56:29)
    - **From:** Sepsis Alliance Institute
    - **Presenter**: Valerie Vaughn, MD, MSc
    - **CE Information**: 1.6 CNE, 1.25 CE for other healthcare professionals
    - **Session Overview:** This presentation will address the current state of antibiotic use at discharge, discuss why providers often overprescribe at discharge, and help improve prescribing and patient outcomes during care transitions.

References

- Burston, J. et al. A Role for Antimicrobial Stewardship in Clinical Sepsis Pathways: A Prospective Interventional Study. *Infect Control Hosp Epidemiol* 2017.
    - Sepsis overdiagnosis and delayed antibiotic optimization may reduce sepsis pathway effectiveness. Early antimicrobial stewardship efforts by Infectious Diseases improved antibiotic management of non-ICU inpatients with suspected sepsis, predominantly by de-escalation.
- De Waele, J.J. et al. Antibiotic stewardship in sepsis management: toward a balanced use of antibiotics for the severely ill patient. *Expert Rev Anti Infect Ther* 2019.
    - Integrating AMS strategies in clinical practice can help upholding the best antibiotic empirical therapy while reducing antibiotic consumption. AMS is a multidisciplinary policy and should be embraced by critical care physicians as a solution for balanced antibiotic use.
- Madaline, T. et al. Early infectious disease consultation is associated with lower mortality in patients with severe sepsis or septic shock who complete the 3-hour sepsis treatment bundle. *Open Forum ID* 2019.

    - Among patients who received the severe sepsis or septic shock bundle, early consultation by infectious disease was associated with a 40% reduction in risk for in-hospital mortality and a trend toward shorter time to antibiotic de-escalation.
- Martinez, M.L. et al. An approach to antibiotic treatment in patients with sepsis. *Journ Thoracic Dis* 2020.
    - Leadership, teamwork, antimicrobial stewardship (AS) frameworks, guideline's recommendations on the optimal duration of treatments, de-escalation, and novel diagnostic stewardship approaches will help us to improve patients' quality of care.
- Rashidzada, Z. et al. Early antimicrobial stewardship team intervention on appropriateness of antimicrobial therapy in suspected sepsis: A randomized controlled trial. *JAC-Antimicrobial Resistance* 2021.
    - A randomized controlled trial of an antimicrobial stewardship team intervention involving a review of antimicrobial therapies 48 hours after a Medical Emergency team call for suspected sepsis vs. no intervention. Those who received a review of medications by the stewardship team had significant improvement in appropriateness of antimicrobial therapy.
- Rhee, C. et al. Prevalence of Antibiotic-Resistant Pathogens in Culture-Proven Sepsis and Outcomes Associated with Inadequate and Broad-Spectrum Empiric Antibiotic Use. *JAMA Netw Open* 2020.
    - In this study, most patients with community-onset sepsis did not have resistant pathogens, yet broad-spectrum antibiotics were frequently administered. Both inadequate and unnecessarily broad empiric antibiotics were associated with higher mortality. These findings underscore the need for better tests to rapidly identify patients with resistant pathogens and for more judicious use of broad-spectrum antibiotics for empiric sepsis treatment.
- Royer, S. et al. Shorter vs. Longer Courses of Antibiotics for Infection in Hospitalized Patients: A Systematic Review and Meta-Analysis. *Journ of Hosp Med* 2018.
    - Based on the available literature, shorter courses of antibiotics can be safely utilized in hospitalized patients with common infections, including pneumonia, urinary tract infection, and intra-abdominal infection, to achieve clinical and microbiological resolution without adverse events on mortality or recurrence.
- Strich, J.R. et al. Considerations for empiric antimicrobial therapy in sepsis and septic shock in an era of antimicrobial resistance. *J Infect Dis* 2020.

    - Patients with sepsis present across a spectrum of infection sites and severity of illnesses requiring complex decision making at the bedside as to when prompt antibiotics are indicated and which regimen is warranted. The precise empiric regimen is determined by assessing patient and epidemiological risk factors, likely source of infection based on presenting signs and symptoms, and severity of illness. Hospitals should implement quality improvement measures to aid in the rapid and accurate diagnosis of patients with sepsis and to ensure antibiotics are given to patients in an expedited fashion after antibiotic order.
- Teshome, B.F. et al. Duration Exposure to Antipseudomonal Beta-Lactam Antibiotics in the Critically Ill and Development of New Resistance. *Journ Human Pharm & Drug Ther* 2018.
    - Among critically ill patients who receive antipseudomonal beta-lactam antibiotics, each additional day of exposure to cefepime, meropenem, and piperacillin-tazobactam is associated with an increased risk of new resistance development.
- Vaughn, V. et al. Thoughtless design of the electronic health record drives overuse, but purposeful design can nudge improved patient care. *BMJ Qual & Saf* 2018.
    - A critical step in improving clinician behavior is recognizing that most decisions occur with little active deliberation. When making rapid choices, clinicians are being influenced by EHR design, defaults, diagnostic stimuli, emotion, and social norms – whether purposeful or not. To improve, we must recognize these tendencies and use thoughtful design to capitalize on the potential of the EHR to improve patient care.
- Wunderink, R.G. et al. Antibiotic Stewardship in the Intensive Care Unit. An Official American Thoracic Society Workgroup Report in Collaboration with the AACN, CHEST, CDC, and SCCM. *ATS* 2020.
    - Report of the findings of a workshop convened to address barriers to antibiotic stewardship in the ICU and discuss tactics to overcome these. The recommendation is for antibiotic stewardship should be a core competency of critical care practitioners, and training programs and continuing medical education are needed to address and assess this skill.

8. Implementing, Evaluating, & Sustaining Quality Improvements

Background, Rationale, and Suggested Implementation Strategies

Implementing Quality Improvements

- Prioritize interventions with multidisciplinary sepsis committee and determine the intervention that is required
- Implement comprehensive educational campaign
- Build necessary components into EMR (i.e., order sets, BPAs, screening tools, etc)
- Engage key stakeholders to support and prioritize interventions

Evaluation of Effectiveness

- After 3 months of guideline use, obtain provider feedback from multiple groups (including hospitalists, internal medicine, emergency department, etc.), and modify accordingly.
- Meet monthly, initially to develop systems and processes. Ongoing meetings to review data, define problem areas, identify underlying causes of problem areas, and determine interventions for improvement.
- Provide resources, including data analytics and information technology support, to operate the program effectively.

Sustaining Improvement

- Provide audit and feedback directly to teams regarding compliance with bundles
- Use internal patient outcome data to assist with decision-making throughout the organization.
- Create performance boards to communicate improvement results to staff and leadership
- Host improvement huddles at short, regular meetings among staff to anticipate problems, review performance, and support a culture of improvement

Resources

HMS Member Hospital Examples

- Henry Ford Sepsis Team Feedback Template
- Henry Ford Sepsis Stars Slide
- Henry Ford LEAN Tool
- Henry Ford Sepsis Scorecard Example
- Spectrum Health Value Analysis Program and Maturity Model
- Assessing Sepsis Process Flow Before and After QI Implementation: Michigan Medicine - Walk the process guide for Sepsis Tracer
- MM Sepsis Tracer Scenario Guide

National Resources

- IHI – Quality Improvement Essentials Toolkit
- IHI White Paper – Sustaining Improvement
- IHI Practical Tips for Successful Sharing - 7 Spreadly Sins
- NIH Resource Library
- AHRQ Tools and Resources
- PDSA Quality Improvement: A Scientific Method of Change One-Pager
- CDC – Policy, Performance, and Evaluation
- NHS – Sustainability Model
- NHS – Improvement Leaders' Guide: Evaluating Improvement
- Canadian Foundation for Healthcare Improvement – Long-Term Success and Sustainability of Healthcare Improvement Guide
- Health Quality Ontario – Quality Improvement Guide
- Health Quality Ontario – Sustainability Planner Instruction Sheet and Tool
- Healthcare Excellence Canada – Long Term Success Tool

HMS-Specific Resources

- July 2023 CWM Breakout Session Recordings (Authentication required)

Webinars

- Tracking and Reporting: Hospital Sepsis Program Core Elements - A CDC Webinar Series
  - **From:** CDC's Project Firstline
  - **Presenters:** Hallie Prescott, MD, MSc; Michelle Evans, MSN, RN, APRN-CNP; Carol Ann Gelderman, MS, BSN, RN, NE-BC, CPHQ, PMP; Nima Sarani, MD
  - **CE Information:** TBD
  - **Session Overview:** CDC subject matter experts and partners discuss how to measure sepsis epidemiology, outcomes, program goals, and the impact of

sepsis initiatives. Discover ways to provide partners with actionable information about sepsis treatment and outcomes.

References

Implementing Quality Improvement

- Alnababteh, M.H. et al. A Multimodal Sepsis Quality-Improvement Initiative Including 24/7 Screening and a Dedicated Sepsis Response Team-Reduced Readmissions and Mortality. *Crit Care Explor* 2020.
    - After the implementation of multimodal sepsis performance initiatives, observations included a higher prevalence of sepsis secondary to screening but a lower prevalence of severe sepsis and septic shock, an improvement in compliance with the sepsis bundle interventions bundle, as well as reduction in hospital readmission and all-cause mortality rate.
- Perlin, J.B. et al. Eisenberg Patient Safety and Quality Awards: SPOTting Sepsis to Save Lives: A Nationwide Computer Algorithm for Early Detection of Sepsis: Innovation in Patient Safety and Quality at the National Level (Eisenberg Award). *Jt Comm J Qual Patient Saf* 2020.
    - Development of the Sepsis Prediction and Optimization of Therapy (SPOT) algorithm for the detection of sepsis from data available in the electronic health record resulted in more timely recognition, faster initiation of treatment, and improved survival for patients.
- Soane, L. et al. Using quality improvement principles to improve the care of patients with severe sepsis and septic shock. *Ochsner J*. 2013
    - A multidisciplinary team approach to sepsis management using protocols and early goal-directed therapy is feasible in a large academic medical center to improve the process of care and outcomes.

Evaluation of Effectiveness

- Clarke, G.M. et al. Evaluating the impact of healthcare interventions using routine data. *BMJ* 2019.
    - Evaluation is an essential part of understanding what impact changes are having, for whom and in what circumstances, and help inform future decisions about improvement and further roll out. There is no standard, ‘‘one size fits all’’ recipe for a good evaluation: it must be tailored to the project at hand.

- Parry, G. et al. Practical recommendations for the evaluation of improvement initiatives. *Int J Qual Health Care* 2018.
    - This paper provides recommendations to inform funders and evaluators on what to look for when evaluating improvement initiatives. Evaluation designs must consider the iterative, adaptive nature of improvement.

Sustaining Improvement

- Doyle, C. et al. Making change last: applying the NHS institute for innovation and improvement sustainability model to healthcare improvement. *Implement Sci.* 2013
    - The Sustainability Model provides a potentially useful approach to measuring teams' view on the likelihood of sustainability and prompting action.
- Hibbert, P.D. et al. How to sustainably build capacity in quality improvement within a healthcare organization: A deep-dive, focused qualitative analysis. *BMC Health Serv Res* 2021.
    - This study revealed interacting components that were deemed necessary for a successful QI program: active involvement of leadership and management, a skilled faculty to assist teams, an agreed and robust QI system, and an understanding that teams matter.
- Silver, S.A. et al. How to Sustain Change and Support Continuous Quality Improvement. *Clin J Am Soc Nephrol* 2016.
    - To achieve sustainable change, quality improvement initiatives must become the new way of working rather than something added on to routine clinical care. Tools to help sustain improvement include process control boards, performance boards, standard work, and improvement huddles.