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Advisers to our Work

We are very grateful to everyone across Ascension who shared their insights, experiences and time to create this toolkit. We would especially like to recognize the following groups and committees for their contributions and thank them for being particularly generous with their time and expertise:

Sepsis Advisory Committee

Therapeutic Affinity Group

Ascension Antimicrobial Stewardship Committee

Ascension Care Excellence
Introduction

Leading the Way in Reducing Sepsis Mortality
Introduction: Leading the Way in Reducing Sepsis Mortality

The statistics on sepsis morbidity and mortality indicate the toll that sepsis and septic shock take across the U.S.¹ and across Ascension. The numbers, however, tell only part of the story. It’s vitally important for us to bear in mind that for every case of sepsis, there is a person, a family and a story. It’s concordant with our Mission, with who we are as One Ascension, to help each of these individuals receive the optimal care necessary so that they can survive and heal after sepsis. It’s also our calling to prevent sepsis, and the harm it causes, whenever possible.

Ascension leadership has elevated sepsis care to one of the highest priorities of our national health ministry. We are rising to this challenge by launching a coordinated, Ascension-wide effort that will be animated by our collective commitment to the principles and strategies of Leading With Quality: The Ascension Way.

Our aspiration is to show what’s possible if we work together to take on sepsis, using the integrated approach to quality, safety and engagement embodied by the Ascension way.

Introduction: Leading the Way in Reducing Sepsis Mortality

Optimizing sepsis care by reducing unwarranted care variation

This effort will focus on improving our processes for the early identification and management of sepsis, as well as the prevention of hospital-acquired sepsis. Timely, person-centered and evidence-based sepsis care results in lower complication and mortality rates. A focus on early identification and intervention supports the prevention of further progression to end-organ damage.

Our success in meeting our bold goals will depend on the expertise and engagement of multidisciplinary teams across our System, collaborating to adopt an evidence-based approach to optimize sepsis care by reducing unwarranted care variation. As One Ascension, we work together to standardize certain processes, approaches and metrics to accelerate learning and to serve as a foundation for improving the care we provide and achieving health equity for those we serve. By aligning our efforts and learning from each other, across the care continuum, we will attain a new level of proficiency in sepsis care, saving lives and enriching the experiences of the persons and families we serve.

Objective and goals

Objective:
To improve the process of preventing, identifying and managing sepsis for the persons we serve, grounded in key principles of the Ascension way – high reliability, enhanced experiences and reduction of care variation.

Process goals

Improvement in early sepsis identification and recognition
Improvement in sepsis care bundle compliance

Outcome goals

Reduction in unwarranted care variation in managing sepsis
Reduction in mortality for the adult population with sepsis

How to use this toolkit

This toolkit is a resource to guide your sepsis care improvement efforts at the Ministry Market or facility level. It was created with the input of dozens of stakeholders across Ascension, including senior leaders, physicians, nurses, pharmacists and quality professionals, to identify practices that can be replicated nationally across the System. Contributors also included specialists in person and family engagement, high reliability, and AIM4Excellence® to enhance the integration of Ascension way strategies into the sepsis effort. Where appropriate, the toolkit includes external best practices from other organizations.
Introduction: Leading the Way in Reducing Sepsis Mortality

This toolkit organizes clinical practices into five chapters that reflect the components of managing adult sepsis and septic shock, with supporting content on person and family engagement, high reliability and AIM4Excellence interwoven throughout the document:

- **Building the team**
- **Reliable early detection**
- **Implementing the treatment bundle for persons with sepsis**
- **Reducing unwarranted variation in managing sepsis**
- **Preventing hospital-acquired sepsis**

At the heart of the Ascension way is the engagement and involvement of persons and families. This priority is present throughout the toolkit and the focus of a dedicated chapter, which ties the Ascension Person and Family Engagement Model specifically to sepsis care.

AIM4Excellence
Ascension Improvement Model for Excellence

Throughout the toolkit, you’ll find action steps, many of which ask you to develop and implement processes and workflows. These action steps will link to a chapter on high reliability and AIM4Excellence, which offers guidance and resources to support your success in creating effective, highly reliable processes and enhanced teamwork.

Each facility should review the practices included in this toolkit and assess the appropriateness and viability of adopting practices based on unique factors in their respective care settings and markets. Our hope is that the information shared within this document will encourage Ascension caregivers to meaningfully connect with each other to discuss these practices and how they support the System’s overall goal of implementing evidence-based strategies and reducing care variation.

Please note: This toolkit focuses on sepsis and septic shock management in the adult population. Early identification and prompt management of suspected cases in both adult and pediatric populations result in significantly improved outcomes. Although the general principles of identification and management are similar in both populations, pediatric patients have unique characteristics that require a modified approach.
Sepsis definitions, bundles and core measures:
National and international context

The high risk of mortality and the urgency of taking immediate action when treating all stages of sepsis drove the development of sepsis care bundles. In 2015, the Centers for Medicare & Medicaid Services (CMS) introduced the Core Measure SEP-1: Early Management Bundle, Severe Sepsis/Septic Shock with the purpose of ensuring compliance with adopting timely delivery of high-quality sepsis care. The Surviving Sepsis Campaign (SSC) recently released a revised Hour-1 Surviving Sepsis Campaign Bundle of Care, which is detailed in Chapter 3 of this toolkit. The revised bundle places even more emphasis than previous versions on the need to begin resuscitation and treatment immediately.

In 2016, new sepsis definitions and early warning signs were released by the European Society of Intensive Care Medicine and the Society of Critical Care Medicine in the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). A task force with expertise in sepsis determined that healthcare practitioners required improved clinical prompts and diagnostic approaches to facilitate earlier identification. Leading sepsis experts reached a consensus and put forth new recommendations for definitions and diagnosis.

The new Sepsis-3 definitions:

Sepsis is defined as life-threatening organ dysfunction due to a dysregulated host response to infection.

Septic shock is a subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality.

The terms “severe sepsis,” “sepsis syndrome” and “septicemia” were deemed redundant or overly narrow and are not included in the new definitions.

The new consensus definitions seek to ensure that persons with sepsis or at risk of developing sepsis receive urgent assessment and treatment since outcomes improve with early recognition and initiation of protocol-based management immediately after the development of sepsis.
Chapter 1

Building the Team
Because early intervention has been shown to improve outcomes, it is essential to establish a protocol to identify and manage sepsis, which should be implemented by a multidisciplinary team. The key stakeholders include staff in the emergency department (ED), intensive care unit (ICU) and other units where persons may develop or be treated for sepsis. The ED cares for more than half of persons admitted to the hospital and is the portal of entry for over 50 percent of persons with sepsis.

The management of sepsis and septic shock should also involve the intensivists, who will assume the care of many of the persons diagnosed with sepsis and septic shock. Hospitalists play an important role in identifying persons with sepsis in the inpatient setting, especially in units other than the ICUs. Many hospitalists care for persons with sepsis in the ICU and other units.

Other important stakeholders include infectious diseases specialists to help in early identification of the potential source of infection and appropriate antimicrobial therapy; infection preventionists to lead hospital-acquired infection prevention efforts; and nurses to help identify sepsis early and assist in timely implementation of the sepsis protocol. Clinical pharmacists help identify the proper antibiotic dosing for the various clinical conditions and timely availability of medication. Ancillary services are needed for the rapid processing of laboratory specimens, e.g., lactate, blood cultures. Finally, a sepsis coordinator is essential to ensure the completion of all elements of the process and the accountability of the different team members.
Chapter 1: Building the Team

Roles of the multidisciplinary team members

**Stakeholder: Senior leaders**

**Members:** Chief quality officer (serves as the Ministry Market sepsis lead), chief clinical officer, chief medical officer, chief nursing officer

- **Chief quality officer, as Ministry Market sepsis lead:** Forms a market-level team to attain sepsis goals and serves as the accountable party
- Ensures local support for the initiative, including engaging the leaders of the disciplines involved in the work to support the effort
- Helps to build capacity for the work by identifying additional resources that may be allocated to the effort
- Evaluates the outcomes and requests accountability of the different stakeholders to support a successful effort

**Stakeholder: Team leader**

**Member:** Usually an ED physician or intensivist

- Brings in a team of physicians, nurse managers/leaders, clinical pharmacists, infection preventionists, laboratory personnel and a sepsis coordinator
- Ensures accountability for the process by the team, engages the key stakeholders and obtains leadership support
- Usually is a technical expert in the process of managing sepsis or septic shock or at least very familiar with the literature
Chapter 1: Building the Team

Stakeholder: Physicians/providers

**Member: ED physician**
- Educates all ED physicians, nurses, midlevel providers and physicians-in-training on the identification and management of sepsis
- Discusses the performance of the ED with other team members when audit results are available
- Communicates responsibilities to other ED physicians:
  - Initiate and implement the sepsis care bundle when indicated.
  - Promptly place central line if needed.
  - Ensure timely disposition to the ICU of persons with septic shock.
  - Listen to and acknowledge the voices and concerns of persons with sepsis or septic shock and their families.

**Member: Intensivist**
- Educates all intensivists, hospitalists, nurses, midlevel providers and physicians-in-training on the identification and management of sepsis
- Discusses the performance of the ICU with other team members when audit results are available
- Engages hospitalists to support early identification of sepsis
- Communicates responsibilities to other intensivists or ICU team members:
  - Promptly follow through on the implementation of the sepsis care bundle.
  - Coordinate care and obtain any additional support needed, e.g., infectious diseases to better identify the source of infection and adjust antimicrobials.
  - Ensure timely disposition to the ICU of persons with septic shock.
  - Listen to and acknowledge the voice and concerns of persons with sepsis or septic shock and their families.

**Member: Hospitalist**
- Engages peers to adopt best practices to treat sepsis and septic shock
- Evaluates all admitted persons for appropriate diagnosis, assesses any changes in condition for inpatients, and adjusts therapy based on source of infection and organisms
- Plays a significant role in early identification and management of sepsis, especially in units other than ICUs
- Coordinates care and obtains any additional support needed, e.g., infectious diseases to better identify the source of infection and adjust antimicrobials
- May play an important role leading sepsis teams, especially in smaller hospitals. For some hospitals, hospitalists may be key players in forming the sepsis team, or leading it, filling the role of intensivists, especially in hospitals with less subspecialty intensive care coverage.
- Listens to and acknowledges the voices and concerns of persons with sepsis and septic shock and their families

**Member: Infectious diseases physician**
- Identifies empiric antimicrobials for different sources suspected for sepsis at time of evaluation; plans recommended regimens
- Works on plans for de-escalation therapy and optimization of antibiotic choices based on diagnosis and pathogen identified
- Promotes the importance of source control in management of sepsis
Chapter 1: Building the Team

Stakeholder: Nurses

Member: ED nurse manager/leader
- Engages nurses on the importance of early identification of sepsis and early, aggressive care
- Works closely with ED physician and other team members to establish the process for early identification and treatment in the ED
- Discusses the performance of the ED with other team members when audit results are available
- Engages the laboratory to make sure the testing workflow is efficient, i.e., obtaining results promptly for blood cultures, lactic acid and other necessary tests
- Coordinates nursing resources to ensure completion of the sepsis care bundle
- Communicates responsibilities to other ED nurses:
  - Prioritize the management of persons with sepsis and septic shock.
  - Promptly address all tasks ordered to manage persons with septic and septic shock, from laboratory orders to medications.
  - Listen to and acknowledge the voices and concerns of persons with sepsis or septic shock and their families.
- Ensures timely disposition to the ICU of persons with septic shock

Member: ICU nurse manager/leader
- Engages nurses on the importance of early identification of sepsis and early, aggressive care
- Works closely with the intensivist and other team members to establish the process for early identification and treatment in the ICU
- Discusses the performance of the ICU with other team members when audit results are available
- Engages the laboratory to make sure the testing workflow is efficient, i.e., obtaining results promptly for blood cultures, lactic acid and other necessary tests
- Coordinates nursing resources to ensure completion of the sepsis care bundle
- Communicates responsibilities to other ICU nurses:
  - Prioritize the management of persons with sepsis and septic shock.
  - Promptly address all tasks ordered to manage persons with sepsis and septic shock, from laboratory orders to medications.
  - Listen to and acknowledge the voices and concerns of persons with sepsis or septic shock and their families.
- Ensures timely disposition to the ICU of persons with septic shock
- Considers adding sepsis metric to the daily management system (DMS) board

Member: Medical/surgical unit nurse leader/manager
- Engages nurses on the importance of early identification of sepsis and early, aggressive care
- Works closely with physicians and other team members to establish the process for early identification and treatment throughout the hospital
- For persons showing signs of clinical deterioration, ensures escalation of notification to and involvement by physicians and/or specialists
- Listens to and acknowledges the voices and concerns of persons with sepsis or septic shock and their families
Chapter 1: Building the Team

Stakeholder: Pharmacists

**Members:** Clinical pharmacist(s)
- Helps the team prioritize the delivery of medications for sepsis and septic shock in the ED and inpatient areas
- Ensures timely and appropriate antibiotic selection based on suspected source of infection
- Works on plans with providers for de-escalation of therapy when a clear diagnosis is made
- Utilizes clinical decision support, i.e., Sentri7®, to ensure follow-up on rules pertinent to antimicrobial stewardship and source control
- Assists in standardization of practices to help reduce care variation by ensuring that standard order sets are utilized
- Assists in expediting other essential medication management, e.g., vasopressors

Stakeholder: Rapid response team (RRT)

**Members:** Typically consists of highly trained critical care nurse, respiratory therapist, intensivist/midlevel provider
- Addresses status changes for unexpected clinical deterioration of persons with sepsis or septic shock and promptly takes action
- Evaluates, in conjunction with the attending physician, the need to initiate sepsis treatment bundle if appropriate
- Communicates with persons/patients and family members to clarify appropriate goals of care

Stakeholder: Infection preventionists

**Member:** Infection preventionist
- Leads hospital-acquired infection prevention efforts with a focus on device-associated infections, *Clostridium difficile*, multidrug-resistant organisms and surgical site infections
- Promotes infection prevention practices to reduce risks associated with cross-transmission, e.g., hand hygiene, environmental hygiene, patient isolation

Stakeholder: Quality

**Member:** Sepsis coordinator
- Coordinates the program with nurses, physicians and other stakeholders
- Ensures the data requirements for audits are met
- Evaluates processes and outcomes for gaps and works with the team and stakeholders to identify solutions
- Distributes educational materials to healthcare workers
- Involves local person and family advisory council (PFAC) in program
Chapter 1: Building the Team

**Stakeholder: Person and family engagement (PFE)**

**Members:** Person/patient and family members
- Expresses concern to nurse or provider when person/patient experiences change in condition
- Clearly outlines preferences for goals of care through an advance care plan or directive

**Member:** Ministry Market PFE leader or designated representative
- Advocates for persons and families
- Connects team members to PFE resources and provides support for their use

**Stakeholder: Palliative care**

**Member:** Palliative care coordinator
- Facilitates advance care planning and promotes person-centered care agreed upon in advance of any deterioration

**Stakeholder: Ancillary services**

**Members:** Laboratory, radiology
- Develops a process to ensure timely reporting and notification of laboratory/radiology results
- Evaluates the appropriateness of initial and repeat laboratory testing and radiology studies
Chapter 2

Reliable Early Identification and Recognition of Sepsis and Septic Shock
Chapter 2: Reliable Early Identification and Recognition of Sepsis and Septic Shock

Sepsis mortality decreases with early recognition and early, aggressive care. However, sepsis is a broad term used to define a process that is not completely understood, making diagnosis difficult. Sepsis is not a specific illness, but rather a syndrome associated with various clinical signs and symptoms in a person with suspected infection. Currently, there is not a standard, validated test for diagnosing sepsis.

This chapter will describe measurable clinical criteria and screening tools that can be used to facilitate early detection of sepsis and septic shock. While a number of screening tools are available to detect changes in a person’s condition (e.g., Modified Early Warning Score, National Early Warning Score), this toolkit will focus on easy-to-use tools that contain criteria that are readily available at the bedside or included in routine laboratory tests. Ultimately, the screening tools utilized at the facility should be determined by your Ministry Market sepsis team. The goal, however, is that every Ascension facility should have a process to systematically screen for sepsis in the emergency department (ED), intensive care unit (ICU) and non-ICUs, using clinical screening criteria.
**Chapter 2: Reliable Early Identification and Recognition of Sepsis and Septic Shock**

**Step 1:**

**Use a screening tool to detect sepsis early**

While there are no perfect screening tools to identify sepsis, many bedside examination findings and routine laboratory tests are indicative of inflammation or organ dysfunction. We describe two screening tools below: The modified systemic inflammatory response syndrome (SIRS) criteria can be used to identify signs and symptoms that should trigger the evaluation and consideration of the possibility of infection and sepsis; the Quick Sepsis-Related Organ Failure Assessment (qSOFA) provides simple bedside criteria that incorporate altered mentation to identify adults with suspected infection who are likely to have poor outcomes. These screening tools do not replace but complement the clinical decision-making of healthcare providers.

**Modified systemic inflammatory response syndrome (SIRS) criteria**

SIRS criteria have been used in the past to screen for persons with possible sepsis. However, SIRS is common in hospitalized patients, so using modified thresholds for evaluation reduces the potential for false positive screens. Ascension uses modified SIRS criteria to improve the positive predictive value of the screen. The signs and symptoms defined below should trigger the consideration and evaluation of the possibility of infection and sepsis.

**Screen for infection: Person meets AT LEAST 2 of 4 criteria***

*Adapted from the Ascension Standard Sepsis Evaluation Alert, located in Appendix I

**Temperature**

< 36 C or > 38.3 C

**Heart rate**

≥ 111 beats per minute

**Respiratory rate**

≥ 23 breaths per minute

**White blood cell count**

< 4,000 cells/mm$^3$ or > 14,000 cells/mm$^3$ or > 10% immature neutrophils
Quick Sepsis-Related Organ Failure Assessment (qSOFA)

An acute change in mentation should trigger a more detailed evaluation for sepsis or other serious events in the hospitalized patient. The qSOFA provides simple bedside criteria that incorporate altered mentation to identify adults with suspected infection who are likely to have poor outcomes (see Appendix II for more information about qSOFA). This tool may be particularly useful for practitioners working outside the ICU as it relies only on clinical examination findings.

The qSOFA consists of three simple tests that clinicians can conduct at the bedside to identify persons at risk for sepsis:

- An alteration in mental status
- A decrease in systolic blood pressure to less than 100 mmHg
- A respiration rate greater than 22 breaths per minute

Evidence of two or more qSOFA elements in persons who have screened positive for infection may be used to identify persons at risk of clinical deterioration. Persons with two or more of these conditions have been shown to have a significantly greater risk of a prolonged ICU stay (three or more days) or of dying in the hospital. The qSOFA criteria can be used to prompt clinicians to consider possible infection in persons not previously recognized as infected and to investigate for organ dysfunction.

STEP 2: Assess for evidence of organ dysfunction

When screening has identified possible sepsis in a person with suspected or documented infection, the next step is to assess for evidence of organ dysfunction. Organ dysfunction can be identified by using the clinical criteria below for life-threatening organ dysfunction.

Screen for organ dysfunction: Person meets ONE or MORE criteria within 3 days of a new infection

<table>
<thead>
<tr>
<th>Lactate level</th>
<th>&gt; 2 mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure</td>
<td>&lt; 90 mmHg OR mean arterial pressure (MAP) &lt; 65 mmHg</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>≥ 2 mg/dL and ≤ 10 mg/dL</td>
</tr>
<tr>
<td>Creatinine</td>
<td>increase of ≥ 0.5 mg/dL in the last 72 hours</td>
</tr>
<tr>
<td>Urine output</td>
<td>&lt; 0.5 ml/kg/hour for at least 2 hours despite adequate fluid resuscitation</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>(platelet count &lt; 100,000 µL)</td>
</tr>
<tr>
<td>Arterial hypoxemia</td>
<td>PaO2/FiO2 &lt; 300</td>
</tr>
</tbody>
</table>
Step 3: Monitor for evidence of septic shock

Septic shock is a subset of sepsis in which circulatory, cellular and metabolic abnormalities are associated with a greater risk of mortality. Septic shock is identified in septic patients with persistent hypotension requiring vasopressors to maintain a MAP ≥ 65 mmHg and with a serum lactate level > 2 mmol/L despite adequate fluid resuscitation. This combination of clinical factors is associated with hospital mortality rates greater than 40 percent. After a detailed initial assessment, these complex patients need ongoing re-evaluation of their response to treatment.

Actions to support early detection

- Educate physicians, nurses, pharmacists and other practitioners about the significance of sepsis and septic shock and the lives that may be saved with early identification and recognition of signs and symptoms.
- Develop a process to systematically screen for sepsis in the ED, ICU and medical units, using appropriate clinical criteria as determined by your sepsis team.
- Develop clear roles and expectations for all members of the healthcare team, and document these roles and expectations in the developed protocols and policy.
- Consider implementation of the Ascension Standard Sepsis Evaluation Alert in the electronic health record (EHR) as appropriate.

Rapid response team (RRT)

- Develop a process for performing a sepsis screen on all persons seen by an RRT.
- RRT members may include an ICU nurse, respiratory therapist, and, in some settings, a hospitalist or an intensivist and clinical pharmacist.
- Ensure RRT members are appropriately trained and educated on the local sepsis screening tools.

High reliability and process improvement

- Standardize communication by using SBAR (Situation, Background, Assessment, Recommendation) and handoff tools.
- Implement a process to provide continuous performance feedback to physicians and staff.
Chapter 3

Implementing the Sepsis Treatment Bundle
Chapter 3: Implementing the Sepsis Treatment Bundle

Sepsis bundles have been integral to the improvement of sepsis treatment for many years. Compliance with the bundles is associated with improved survival in persons with sepsis or septic shock. The bundle elements were designed to be updated as new evidence is published, so they continue to evolve. The Surviving Sepsis Campaign (SSC) recently released a revised Hour-1 Surviving Sepsis Campaign Bundle of Care. The 2018 bundle was developed with the intention of beginning resuscitation and management immediately, especially in persons with hypotension.

The 2018 bundle elements should be initiated within the first hour of the time of presentation or “time zero.” The Hour-1 Surviving Sepsis Campaign Bundle of Care defines time zero as the time of triage in the emergency department (ED) or, if presenting from another care area, from the earliest chart documentation consistent with all elements of sepsis or septic shock, as determined through chart review. More than one hour may be necessary for resuscitation to be completed, but initiation of resuscitation and treatment needs to begin immediately.

### 2018 Revised Hour-1 Surviving Sepsis Campaign Bundle of Care

<table>
<thead>
<tr>
<th>Measure lactate level.</th>
<th>Obtain blood cultures before administering antibiotics.</th>
<th>Administer appropriate antibiotics.</th>
<th>Begin rapid administration of 30 ml/kg crystalloid, preferably normal saline or lactated ringers, for hypotension or lactate ≥ 4 mmol/L.</th>
<th>Apply vasopressors, preferably norepinephrine, if person is hypotensive during or after fluid resuscitation to maintain mean arterial pressure ≥ 65 mm Hg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated serum lactate serves as a marker of tissue hypoperfusion. If an initial lactate is &gt; 2mmol/L, it should be remeasured within 2-4 hours to guide resuscitation.</td>
<td>Blood cultures must be obtained before the administration of antibiotics as sterilization of cultures can occur with the first dose of an appropriate antimicrobial.</td>
<td>Appropriate antimicrobials to cover most likely pathogens depending on potential source should be started immediately for persons presenting with sepsis or septic shock (see Appendix III for Ascension Antibiotic and Lab Recommendations for Treatment of Sepsis by Source in Adults). De-escalation of antimicrobial therapy should occur when pathogen identification and sensitivities are established. If it is determined that the person does not have an infection, antibiotics should be discontinued.</td>
<td>The stabilization of sepsis-induced tissue hypoperfusion or septic shock is mitigated by early fluid resuscitation. Urgent fluid resuscitation should begin and be completed within 3 hours of recognizing a patient with sepsis and/or hypotension and elevated lactate. Upon initial resuscitation, additional fluid administration should be carefully assessed to determine the likelihood that the person remains fluid-responsive.</td>
<td>If the person remains hypotensive after fluid resuscitation, vasopressor administration should occur within the first hour to achieve a mean arterial pressure (MAP) of ≥ 65 mm Hg. Restoring adequate perfusion pressure to vital organs should not be delayed.</td>
</tr>
</tbody>
</table>

**TIME ZERO**

The time of triage in the ED or, if presenting from another care area, from the earliest chart documentation consistent with all elements of sepsis or septic shock, as determined through chart review.
Chapter 3: Implementing the Sepsis Treatment Bundle

Action steps to support bundle implementation

General support

- Implement order sets to cover all bundle elements and include documentation requirements: Ascension Suspected Severe Sepsis/Septic Shock Order Set – ED and Ascension Suspected Severe Sepsis/Septic Shock Order Set – Inpatient.
- Always establish time zero to support appropriate timing of the interventions recommended in the protocols. Use visual cues in the environment and in the EHR to maintain awareness that “the clock has started.”

Measure lactate level.

- Develop a process with the laboratory department to obtain serum lactate level results in less than one hour.
- Develop a protocol for immediate notification of the attending physician of lactate levels > 4mmol/L, which is the critical lab value for lactate.

Obtain blood cultures before administering antibiotics.

- Develop order sets that bundle lactate levels and blood cultures.
- Develop a process that ensures staff is immediately available to draw blood cultures prior to antibiotic administration (ensure aseptic draw to reduce contamination risk), within the first hour of care.

Administer appropriate antibiotics.

- Implement order sets for the prescription and administration of the selected antibiotics based on suspected source of infection. (See Appendix III for Ascension Antibiotic and Lab Recommendations for Treatment of Sepsis by Source in Adults.)
- Ensure that STAT/NOW designation is prebuilt into all antibiotic orders within the order set for timely verification of order by pharmacy.
- Place the recommended antibiotics in the ED and critical care unit medication delivery system so that they will be easily and rapidly accessible.
- When multiple antibiotics are appropriate, ensure the beta-lactam agent is administered first. IV push route is recommended as appropriate for timely administration of beta-lactam antibiotics.

Begin rapid administration of 30 ml/kg crystalloid for hypotension or lactate ≥ 4 mmol/L.

- Develop a protocol and order sets for placement of a large bore IV, an interosseous needle or a central line to provide an effective access route for fluid infusions in persons with sepsis. Train the appropriate staff as necessary to enhance placement skills.
Chapter 3: Implementing the Sepsis Treatment Bundle

High reliability and process improvement

- Develop a handoff tool to standardize communications among various departments and disciplines. Standardized communications promote continuity in resuscitations if persons are moved between departments.
- Implement a process to provide continuous performance feedback to physicians and staff.

Mrs. Smith has end-stage renal disease and receives hemodialysis three times weekly. After returning home from her latest dialysis session, she tells her husband she is just not feeling well. She reports feeling chilled and short of breath. She seems a little confused. Her husband takes her to the emergency department, where she is diagnosed with sepsis and possible pneumonia. She is admitted to the medical unit after a sputum culture is taken, and a broad-spectrum beta-lactam antibiotic is initiated. Mrs. Smith does not show clinical improvement after two days, and blood cultures are drawn. The blood cultures grow methicillin-resistant *Staphylococcus aureus*, and vancomycin is initiated. She is diagnosed with a dialysis catheter-related infection. Unfortunately, Mrs. Smith continues to deteriorate and passes away on her sixth day of hospitalization.

Lesson to learn:
Correct diagnosis and compliance with the hour-1 sepsis bundle, including obtaining blood cultures, may have saved Mrs. Smith’s life.
Chapter 4

Reducing Unwarranted Variation in Managing Sepsis
Chapter 4: Reducing Unwarranted Variation in Managing Sepsis

As described in Chapters 2 and 3, this toolkit provides evidence-based guidance on how to improve processes for the early identification of sepsis and for compliance with the hour-1 bundle in order to improve outcomes for the persons we serve by reducing unwarranted variation in care. When managing persons with suspected sepsis, the clinician initiates testing and the provision of other supportive therapies, which are also optimized by the adoption of evidence-based best practices.

This chapter reviews a number of best practices for diagnostic testing, management of high-risk infections and provision of supportive therapies, all of which rely on successful collaboration among multiple disciplines and departments. Clinicians from various disciplines, including emergency medicine, intensive care, hospitalists, nursing, pharmacy, laboratory and other supporting services, need to work together as engaged partners.

**Optimize diagnostic testing**

Unless the source of sepsis is clear, testing may range from a few focused laboratory tests to a larger variety of laboratory and imaging tests. Tests that do not provide value in improving care should be avoided. Note that based on the pretest probability, indiscriminate testing during patient evaluation may result in false positives, which may lead to potential misdiagnosis or delay in reaching the correct diagnosis. The National Academy of Medicine has demonstrated that diagnostic errors in healthcare occur for many reasons, including inadequate collaboration and communication among clinicians, patients and their families; a work system not well designed to support the diagnostic process; and limited feedback to clinicians about diagnostic performance. Each of these root causes can be addressed using the principles and tools of high reliability and AIM4Excellence®.

Several steps can be taken to improve the diagnostic process while avoiding tests that do not provide value in improving care:

**Obtain a detailed medical history**

A good history may provide indications of likely sources of sepsis, which will assist in choosing the most appropriate testing and treatment. For example, a pulmonary source of infection should be investigated in a person presenting with new onset respiratory symptoms, hypoxia and signs of sepsis. On the other hand, more attention to a potential urinary source would be given to a person with a history of genitourinary structural disease and sepsis.

**Use sepsis order sets**

Evidence-based guidelines already have been approved and incorporated into order sets across Ascension facilities. These order sets include testing and optimized antibiotic choices based on suspected source. In addition, key management elements, such as fluids, lactate testing and vasopressors, are incorporated into the order sets. Additional tests may be ordered by the clinician if there is a need. The use of order sets does not replace the clinician’s judgment in decision-making to identify the source of sepsis.
Avoid unnecessary testing

Understanding the value of the tests ordered helps clinicians decide whether the tests are useful to the care. Below are a few examples of test results that may not indicate that the person has infection.

- **Urinalysis and reflex to urine cultures.** Asymptomatic bacteriuria is a common finding in elderly persons, especially those presenting from a long-term care setting or those with a chronic urinary catheter. Thus, a urinalysis will likely show abnormal results in this population. Abnormal urinalysis results such as nitrite or leukocyte esterase positive often are followed by urine cultures. Because of the high prevalence of asymptomatic bacteriuria in the elderly population, a positive urine culture may not indicate that the urine is the source of infection unless the person is symptomatic.

Urinalysis and urine cultures should be avoided unless there are symptoms suggestive of a urinary source (e.g., urinary retention, dysuria or frequency) or unless there is no other identified source for sepsis in persons who cannot provide a history, when testing for exclusion may be appropriate. In addition, urinalysis reflex to urine cultures should not be utilized in the emergency department or inpatient setting.

- **Diagnostic imaging.** Chest radiographs are commonly used in the workup of persons with sepsis. However, results such as “cannot rule out infiltrate” or “infiltrate vs. atelectasis” are commonly reported. It is important to match the clinical symptoms to radiographic findings. In addition, indiscriminate use of computerized tomography may risk identifying findings that are not clinically relevant but lead to further unnecessary testing or interventions.

Consider select use of diagnostic laboratory tests for their negative predictive value

Certain tests may be useful in workup of infection only if their result is negative:

- **Procalcitonin.** For example, a negative procalcitonin result is very helpful to rule out bacterial pneumonia in a febrile patient. On the other hand, a positive procalcitonin result does not rule in bacterial pneumonia. Procalcitonin testing should be reserved for one-time orders by the provider or pharmacist within 24 hours of initiation of antibiotic therapy in persons with an active order for a systemic antibiotic for the indication of community-acquired pneumonia. There is insufficient evidence to suggest that procalcitonin-based algorithms improve antibiotic use in persons with sepsis; therefore, use is not recommended in that setting. Serial (multiple) procalcitonin levels should NOT be ordered for any infection source, including in the context of sepsis. Please refer to the Ascension Adult Procalcitonin Use Recommendations for additional information.

- **Methicillin-resistant *Staphylococcus aureus* (MRSA) nasal screen for persons with pneumonia.** A MRSA nasal screen has high negative predictive value to indicate that MRSA is not the causative agent for pneumonia. However, a positive MRSA screen does not necessarily indicate MRSA as the etiology of the pneumonia. For additional information on how nasal MRSA polymerase chain reaction (PCR) screening can be an important tool to guide the de-escalation of anti-MRSA antibiotics in pneumonia, refer to the Ascension guidelines on Use of the Nasal MRSA Polymerase Chain Reaction (PCR) Screen as an Antimicrobial Stewardship Tool to Improve Utilization of Anti-MRSA Agents for Pneumonia.
Chapter 4: Reducing Unwarranted Variation in Managing Sepsis

Standardize care for high-risk infections

Standardization of certain practices is important to help improve outcomes for high-risk infections. One example in which standardization is critical to improved care outcomes is management of *S. aureus* bacteremia. *S. aureus* bacteremia is associated with significant mortality. Thus, it is imperative that clinicians practice strict adherence to approved guidelines to reduce mortality. Adherence to the algorithm can be achieved through the following: prompt source control, follow-up blood cultures until clearing of bacteremia, appropriate diagnostic evaluation through echocardiogram, appropriate antibiotic therapy, appropriate duration of therapy, and infectious diseases consultation. For more information on specific performance measures for the management of *S. aureus* bacteremia that will lead to improvement in outcomes, refer to the Ascension *Staphylococcus aureus* Bacteremia Management Guidelines.

Provide evidence-based supportive therapies

Additional therapies may be necessary to support the care of persons with sepsis or septic shock, such as blood product administration; mechanical ventilation; sedation and analgesia; glucose control; renal replacement therapy; deep vein thrombosis prophylaxis; stress ulcer prophylaxis; and nutritional support. Unlike the items in the sepsis treatment bundle, these therapies have specific clinical indications and are not generalizable to the entire sepsis population.

Action steps to reduce variation in the therapeutic management of persons with sepsis

- Monitor adherence to evidence-based guidelines, including use of order sets facilitating therapeutic management and effective person/patient monitoring.
- Utilize clinical decision support, i.e., Sentri7®, to ensure follow-up on rules pertinent to antimicrobial stewardship, source control and reducing clinical variation.

Medication management

- Ensure the appropriate utilization and monitoring of targeted medications utilized in persons with sepsis.
- Ensure that evidence-based medication therapy is adjusted based on clinical condition, laboratory testing and microbiology results.
- Adhere to standard medication preparation and administration guidelines.

High reliability and process improvement

- Use high-reliability and AIM4Excellence processes and resources to improve collaboration and coordination across multidisciplinary teams.
- Implement a process to provide continuous performance feedback to physicians and staff.
Chapter 5: Preventing Hospital-Acquired Sepsis

In addition to early identification and prompt management of sepsis, prevention is key to achieving better outcomes. This chapter focuses on the prevention of hospital-acquired sepsis, which is sepsis that was not present on admission but that develops over the course of a hospital stay. Many of the hospital-acquired conditions that are publicly reported to the Centers for Medicare & Medicaid Services (CMS) are associated with sepsis.

Good compliance with infection prevention practices will reduce the risk of persons developing hospital-acquired sepsis. Persons at risk of developing infection in the hospital include those with weakened immune systems, frail elderly persons, or those with interventions, either surgical or related to device placement. Close partnership among the infection prevention teams, physicians and nurses will lead to safer utilization of devices and improved surgical perioperative care.

### Manage device risk

All devices, whether peripheral or central venous catheters, urinary catheters, or ventilators, increase the risk that persons will develop infectious and noninfectious complications. It is important to decide on the most appropriate use of devices, ensure adequate care of the device, and promptly remove the device when no longer needed. A key practice to minimize device risk is daily assessment of device need and risk by the clinicians involved in the care, whether physicians or nurses. Gaps in caring for peripheral or central venous catheters may lead to bloodstream infections, sepsis and septic shock.

Device risk may be mitigated by complying with best practices for care of the device and by promptly removing the device when the person no longer requires its use. Similarly, urinary catheters may lead to catheter-associated urinary tract infections (CAUTI) and bloodstream infections associated with a urinary source, all of which are preventable events if close attention is paid to the need for and care of the catheter. Finally, the longer individuals are on mechanical ventilator support, the higher the risk the person will develop ventilator-associated pneumonia (VAP), which is associated with high mortality and morbidity.
Prevent surgical site infections

Preventing surgical site infections also helps reduce the risk of sepsis. Collaborative work among surgeons, nurses and operating room leadership helps optimize surgical outcomes. Standardization of preoperative, intraoperative and postoperative processes and the use of agreed-upon best-practice bundles for different procedures help reduce risk. The Ascension Adult Surgical Prophylaxis Antibiotic Guidelines should be utilized at all Ascension sites to guide the rational, safe and effective use of antimicrobial agents for the prevention of adult surgical site infections, based on currently available clinical evidence.

Prevent the transmission of pathogens

Another critical element for reducing the risk of sepsis is preventing the transmission of pathogens from healthcare workers to persons/patients or from person to person. The increasing prevalence of multidrug-resistant organisms, combined with the increasing complexity of care and the numbers of persons seen at our sites of care, underscores the importance of practicing standardized clinical care for the persons we serve. Persons with a wide range of infectious diseases, some communicable, commonly receive care in our hospitals. The goal of infection control is to prevent the transmission of pathogens among persons/patients, staff members and visitors.

A multitude of variables needs to be managed to achieve the prevention of pathogen transmission, ranging from environment, to equipment, to healthcare worker behaviors and clinical practices. Hand hygiene remains of paramount importance for preventing the spread of disease-causing germs in the healthcare setting. In addition, proper use of personal protective equipment by healthcare workers helps reduce the risk of exposure to potential pathogens as well as cross-transmission. For example, a person with *Clostridium difficile* diarrhea may expose other persons/patients and healthcare providers if we do not perform adequate hand hygiene, implement contact precautions and reduce risk of fomite transmission. Similarly, multidrug-resistant organisms such as carbapenem-resistant *Enterobacteriaceae* (CRE) may lead to hospital outbreaks and sepsis with very poor outcomes if proper infection control practices are not performed.
Mr. Nelson was an active 72-year-old who had recently reached the point where he could no longer function well because of hip pain. He was excited about the prospect of having a hip replacement procedure so he could get back to walking his dog and playing golf.

Mr. Nelson’s hip replacement surgery was a success. After surgery, he had some urinary retention, and a urinary catheter was used for a prolonged period while he was undergoing rehabilitation. On the fifth day after surgery, he suffered a spike in fever and a drop in blood pressure. He had developed sepsis associated with a catheter-associated urinary tract infection and bacteremia. He was treated with antibiotics for *Escherichia coli* bacteremia for a urinary source and discharged home.

Two weeks after discharge, he began to experience more pain in his hip area. His surgeon assured him that it was most likely due to his increased activity since the incision looked fine and there was no drainage. The pain persisted, and his wife brought him back to the emergency department as his incision had become inflamed and started draining a reddish-yellow fluid. Mr. Nelson was not looking well and seemed confused. The surgeon immediately took him to the operating room to reopen the hip incision. Mr. Nelson was diagnosed with sepsis from a deep surgical site infection. Cultures came back positive for *Escherichia coli* bacteremia associated with his recent urinary tract infection.

**Lesson to learn:**
Early postoperative removal of the urinary catheter could have prevented the CAUTI and the hematogenous seeding of infection to the hip.
Chapter 6

Engaging and Educating Persons, Families and Caregivers
Persons and families are **vital partners** in the early identification of sepsis. Family members may notice subtle signs of deterioration in their loved one, not yet recognized by the clinicians providing care, and should be empowered to speak up about their concerns. For example, the Quick Sepsis-Related Organ Failure Assessment (qSOFA), described in Chapter 2, identifies an alteration in mental status as one of three indicators to identify persons at risk of sepsis. **Family members are the experts** when it comes to understanding what is normal and what is not normal with their loved one’s mental status. The high-reliability principle of “deference to expertise” demands that we respect that expertise as we make decisions about care.

The **Ascension Person and Family Engagement (PFE) Model** provides a framework for how to involve persons and families in sepsis identification and care. This integrated and holistic model, grounded in evidence-based best practices as well as innovations developed within our local ministries, takes the form of a feedback loop with three components – Listen, Take action, Learn together.

### Person and Family Engagement Model

#### Listening with empathy, across the continuum
Enhance how we listen to our patients, families, providers, associates and the community at large, putting the pieces together to tell the human story and to understand the journey through the eyes of our stakeholders.

- Big picture: CAHPS measures/loyalty surveys
- Person and Family Advisory Councils
- Leader rounding with persons/families and providers/associates
- Compliments and complaints: event reporting system, social media
- myVoice feedback
- Consumer focus groups

#### Taking meaningful action
Based on what we learn by listening, drive improvement, alignment and integration.

- Teamwork is key (local/national partnerships, coaching by internal PFE team)
- Agile, real-time actions along with systematic improvement
- Reduce redundancy, silos and wasted effort
- Targeted use of AIM4Excellence strategies, such as A3 problem-solving

#### Learning together
Foster an aligned approach to learning and improving.

- Shared understanding of PFE
- Key partnerships across Ascension
- Real-time resources
- Opportunities to collaborate/communicate (webinars, online forums/social media)
Chapter 6: Engaging and Educating Persons, Families and Caregivers

Protect our patients by engaging family members: Listen and take action

The foundation of Ascension’s approach to PFE is listening with empathy to make a human connection and truly hear the voices of those we serve, paying attention to what a person says, how they say it and their body language. The objective is to build the care around what matters most to the person and their family.

In the context of sepsis care, it is critical to create a dynamic in which family members feel empowered to report signs that their loved one does not seem to be getting better or is getting worse. If a family member reports that their loved one is confused or disoriented, short of breath, feverish, shivering or feeling cold, in extreme pain or discomfort, or has clammy or sweaty skin, this report should prompt further investigation and screening. Encourage family members to speak up if something just doesn’t seem right.

If a family member voices a concern, the clinician should then take action. Clinicians should acknowledge to the family member that they hear the concern and explain what they are going to do to investigate it. Then, they need to continue to update the family as they follow up on the concern.

Tips for communicating effectively with persons and families

- Speak in plain language. Use medical terminology only when necessary, and clearly explain what each term means. Avoid the use of abbreviations and acronyms.

- Repeat back what you hear the person saying to make sure you are understanding their concern. Use “teach back” techniques to assess the person’s understanding of what you are saying.

- Ask, “In what language do you prefer to discuss your healthcare?” Even if the person appears to speak English well, always ask the question. He or she may still prefer to use a language other than English. Provide interpreter services if appropriate.
Educate persons with risk factors on how to prevent sepsis, how to identify sepsis symptoms and when to seek help

Speaking with persons and families about the risks and symptoms of sepsis is one of the most important things medical professionals can do to raise awareness. Anyone can get an infection and almost any infection can lead to sepsis; however, certain persons are at higher risk:

- Adults 65 or older and children younger than 1 year old
- Persons with chronic medical conditions, such as diabetes, lung disease, cancer and kidney disease
- Persons with weakened immune systems

Ensure all persons are educated on how to prevent sepsis, the signs and symptoms of sepsis, and when to seek medical attention.

Consider a palliative care consultation

Palliative care focuses on improving quality of life for individuals facing chronic or life-threatening conditions. At the heart of palliative care is finding out what matters most to persons and families and helping them make informed decisions based on their care goals.

The palliative care team screens for pain and other physical symptoms, as well as spiritual distress and psychosocial needs, and works to get the right members of the care team involved to address what matters to the person and family.

Set clear expectations for life after sepsis

Survivors of sepsis often suffer long-term cognitive impairment and functional disability requiring additional caregiving needs postdischarge. Sepsis advocacy groups stress an urgent need to address the long-term needs of survivors of sepsis, both the person affected and their family.

Studies have shown that many sepsis survivors are left with major new deficits in their ability to live independently. One study found that, on average, sepsis survivors had 1.5 new functional limitations compared to their presepsis baseline, such as requiring the help of a caregiver to manage finances, take medicine, bathe or get dressed. In addition, there was a tripling of the risk for moderate or severe cognitive impairment. Survivors report they are left with physical and/or psychological long-term effects, such as:

- Insomnia – difficulty getting to sleep or staying asleep
- Nightmares, vivid hallucinations and panic attacks
- Disabling muscle and joint pains
- Extreme fatigue
- Poor concentration
- Decreased mental (cognitive) functioning
- Loss of self-esteem and self-belief

It’s essential that we support the healing of our sepsis survivors by helping them understand the challenges they may face and connecting them with the resources they need to heal.
Chapter 6: Engaging and Educating Persons, Families and Caregivers

References

• Numerous resources to support PFE are available on myCommunities.

• Educational resources for persons and families from the Centers for Disease Control and Prevention (CDC):
  • CDC sepsis portal
  • CDC’s “Get Ahead of Sepsis” resources
  • Life After Sepsis Fact Sheet
Chapter 7

Using High Reliability and AIM4Excellence® as Frameworks for Improvement
As One Ascension, we are committed to being a high reliability organization as a key strategy of the Ascension way to lead with quality. A high reliability organization is one that delivers on what it intends to do, putting in place systems, processes and behaviors to build strong teams committed to quality, safety and engagement. To meet our collective aspiration to attain a higher level of proficiency in sepsis prevention, identification and management, we will need every stakeholder and team member to participate in the culture of high reliability and live its principles as “the way we do things here.”

AIM4Excellence® is our organizational methodology for continuous process improvement and serves as an engine to drive the establishment and sustainability of a high-reliability culture. AIM4Excellence provides the common structure, concepts and behaviors necessary for improving and achieving excellence throughout the organization.

This chapter looks at the immediate relevance of high-reliability principles to the optimization of sepsis care and suggests ways that you can use the resources of AIM4Excellence to improve processes and enhance teamwork as you advance your sepsis goals.

### The five principles of high reliability

Ascension has adopted the five principles of high reliability to foster a behavior-based model for our high reliability organization: three principles of anticipation and two principles of containment. These principles are defined below and illustrated by examples of immediate relevance to sepsis care.

#### Three principles of anticipation

Continuously anticipating where an error or failure can occur and creating processes and building barriers to prevent errors from occurring:

1. **Preoccupation with failure.** Be alert to what could go wrong. To avoid failure, we must openly recognize, report and track weak signals of failure or near misses. We must consider these situations as opportunities to learn and prevent harm.

   **Examples**
   - Sepsis mortality decreases with early recognition and early, aggressive care. Clinicians should be vigilant to detect acute status changes in the persons under their care, which should then trigger further evaluation for cause and prompt mitigation plans. The screening tools described in Chapter 2 may be used. Clinical judgment is key to identify and promptly intervene when signs and symptoms of a potential infection are identified. Concerns voiced by family members about status changes in their loved one should be heard and investigated.
   - Clinicians should be attentive to potential gaps in compliance with any element of the hour-1 sepsis bundle detailed in Chapter 3 and prepared to evaluate and mitigate the failure.
2. **Reluctance to simplify.** Avoid simplifying. Simplified processes are desired, NOT a simplified understanding of processes. We must have awareness that our environment is complex and acknowledge that we should consider the full range of opportunities to prevent errors.

   **Example**
   • We often rush to label an event instead of evaluating the whole picture. If a person develops shortness of breath and a chest radiograph shows an infiltrate, reluctance to simplify calls us to address the context. We would not rush to call it pneumonia unless other signs and symptoms are compatible. Other possibilities include congestive heart failure or pulmonary embolism. The use of standardized order sets based on the suspected source also helps identify the most appropriate tests and treatments.

3. **Sensitivity to operations.** Be attuned to the front-line work and mindful of the complexity of the systems in which providers and associates work. Recognize that we work in complex environments with frequent change; therefore, situational awareness is critical to provide safe and reliable care.

   **Example**
   • Recognize the need to have a mechanism to identify sepsis early through either electronic alerts or through hardwiring routine evaluation for any status changes by front-line staff. Acknowledge the need for further support in persons with acute clinical deterioration by deploying rapid response teams when needed.

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### Two principles of containment

The ability to react rapidly to minimize the impact of an event that has occurred and to return to normal operations in the shortest possible time:

1. **Commitment to resilience.** Resilience is the capability to maintain structure and function after an unexpected or unanticipated event has occurred.

   **Example**
   • A team loses a key member who was essential in the management of sepsis. The team addresses the need and adopts plans to fill any void. Staff of a unit that experiences a large increase in complicated admissions quickly devise a plan to address all aspects of care without taking any shortcuts.

2. **Deference to expertise.** Highly reliable organizations de-emphasize hierarchy to allow the individual(s) with the appropriate knowledge relevant to an issue or concern to be engaged in the decision-making process. This includes deferring to the individuals doing the work because they have the expertise.

   **Examples**
   • The evaluation and management of sepsis requires a team approach to establish and monitor use of sepsis treatment bundles. A diverse multidisciplinary team will identify potential sources of infection and establish processes to ensure completeness and accountability for sepsis prevention and management. A specialty pharmacist may provide optimal advice on medication management to the attending physician.
   • A family member of a patient notices that her loved one seems confused and uncomfortable compared to the day before. While rounding with the person and family, a nurse listens to the family member, recognizes the family member’s knowledge of her loved one and takes action to investigate the concern.
Building and sustaining a high reliability organization through AIM4Excellence

The five principles of high reliability align directly with the concepts of AIM4Excellence.

<table>
<thead>
<tr>
<th>Five principles of high reliability</th>
<th>Key concepts of AIM4Excellence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoccupation with failure</td>
<td>Use of the daily management system (DMS) to track barriers preventing us from achieving our goals and to hold daily huddles to discuss issues for learning and future prevention</td>
</tr>
<tr>
<td>Reluctance to simplify</td>
<td>Using process mapping to fully understand our current state and the complexities and handoffs involved before creating a future-state plan</td>
</tr>
<tr>
<td>Sensitivity to operations</td>
<td>Cultural enablers to create leaders who respect every individual, lead with humility and embrace transparency</td>
</tr>
<tr>
<td>Commitment to resilience</td>
<td>Key understanding that errors are often the result of an ineffective process rather than a mistake by an individual. The team comes together to address an error without assigning blame to an individual.</td>
</tr>
<tr>
<td>Deference to expertise</td>
<td>Fundamental principle that front-line associates are truly the experts in the work and must be involved in any improvement work and standard work creation</td>
</tr>
</tbody>
</table>

Daily management system

A recurring action item throughout this toolkit is to “Implement a process to provide continuous performance feedback to physicians and staff.” The daily management system (DMS), a primary methodology of AIM4Excellence, provides a structure to help you accomplish this. The DMS enables:

- **Innovation** and **problem-solving**
- **Daily interaction** among leaders, providers and front-line associates, which taps into the expertise and feedback of all team members
- A heightened **focus on sustainment**

Essential elements of a high reliability organization are **daily huddles** and **rounding to influence**, which work together as an integrated approach: What we learn by listening as we round with key stakeholders can be brought back to the huddle for team collaboration and problem-solving. Utilizing a DMS board gives departments a visual space around which to huddle and track key information each day. The board provides a consistent forum for communicating and sharing critical information.

One of the key components of the DMS board is the identification of one or two “critical few” goals that the department will be tracking daily. This process is done by hand, not with a computer, by the associates in the department, allowing associates to begin to create a Pareto and identify root-cause barriers in real time. For example, in the emergency department (ED), the ED director may define one of the department’s critical few goals as 100 percent compliance with the hour-1 sepsis bundle, including the consistent establishment of time zero. Now, on a daily basis, the staff in the department can note on the board the number of sepsis cases presenting to the emergency department and a “yes” or “no” as to whether the bundle was completed within the hour. From there, for each of the “no” responses, the team can create a real-time Pareto of reasons why or barriers that prevented them from hitting the timeline, such as “delay in blood culture turnaround time” or “appropriate antibiotics were not on hand.” This tracking allows the department to more quickly address the issues preventing them from reaching their goals and delivering the best care to the persons they serve.
Chapter 7: Using High Reliability and AIM4Excellence as Frameworks for Improvement

**Standard work**

Our success in meeting our bold goal to save lives depends on the adoption of an evidence-based approach to optimize sepsis care by reducing unwarranted care variation. A key AIM4Excellence tool for reducing variation in a process is the utilization of standard work. Standard work is a clear, concise, written description of how to perform a particular task so that the outcome is safe, efficient and of the highest quality every time.

For example, in Chapter 2, we describe the use of the modified systemic inflammatory response syndrome (SIRS) criteria as a screening tool for the early detection of sepsis. When a provider or nurse identifies an individual meeting two of the four criteria, as instructed by the tool, there needs to be standard work explaining the next steps to take:

- **What** to do
- Exactly **how** to do it (to prevent unwarranted variation)
- **When** to do it
- **Why** each step is important

These steps need to be built into the workflow of the providers and nurses. If new processes are being introduced within the department, create visual standard work using pictures and symbols to communicate more efficiently so that the new process doesn’t become a lengthy document lost in a folder or binder.

**Resources to support the work**

- Reach out to your local performance improvement team for support and coaching.
- Visit the AIM4Excellence myCommunities site for additional improvement tools and resources: [www.ascension.org/AIM4Excellence](http://www.ascension.org/AIM4Excellence).
- **Leading With Quality: The Ascension Way** provides rich content on high reliability in Chapter 5 and AIM4Excellence in Chapter 7, including a section on A3 problem-solving.
References and Appendices
References and Appendices

References


Appendix I: Ascension Standard Sepsis Evaluation Alert

Start

- Temperature < 36 C or > 38.3 C
- Heart rate ≥ 111
- Respiratory rate ≥ 23
- WBC > 14k or < 4k or band > 10% (without colony-stimulating factors present)

2 out of 4 SIRS criteria met?

NO

Continue monitoring

YES

Look back 30 hours for organ dysfunction (12 hours for lactate)

- Lactate > 2.0 mmol/L
- SBP < 90 mmHg or MAP < 65 mmHg
- Bilirubin ≥ 2.0 mg/dL and ≤ 10.0 mg/dL
- Creatinine increase of ≥ 0.5 mg/dL over 72 hours

At least 1 organ dysfunction + 2 SIRS?

NO

At least 3 SIRS criteria met?

NO

Fire “Sepsis Evaluation Alert”/send notifications

YES

Indication of chronic renal disease or rhEPO present?

NO

Exclude from organ dysfunction criteria

YES

Continue monitoring

Indication of chronic renal disease or rhEPO present?

NO

Exclude from organ dysfunction criteria

YES

Continue monitoring
Appendix II: Quick Sepsis-Related Organ Failure Assessment (qSOFA)

Click here for a full-size, printable version of the qSOFA infographic.
### Appendix III:

**Ascension Antibiotic and Lab Recommendations for Treatment of Sepsis by Source in Adults**

<table>
<thead>
<tr>
<th>Suspected infection source</th>
<th>Risk factors</th>
<th>Recommendations: Antibiotics</th>
<th>Recommendations: Additional studies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intra-abdominal source</strong></td>
<td><strong>Mild/moderate Community onset</strong></td>
<td><strong>Preferred:</strong> Ceftriaxone 1g IV q24hr PLUS metronidazole 500 mg IV q8hr</td>
<td>CBC with diff, BMP, blood culture x2, liver enzymes, amylase, lipase</td>
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<tr>
<td></td>
<td></td>
<td><strong>For biliary tract infection:</strong> Ceftriaxone 1g IV q24hr</td>
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<td></td>
<td></td>
<td><strong>For confirmed penicillin and cephalosporin allergy:</strong> Ciprofloxacin 400 mg IV q12hr PLUS</td>
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<tr>
<td></td>
<td></td>
<td>metronidazole 500 mg IV q8hr</td>
<td></td>
</tr>
<tr>
<td><strong>Intra-abdominal source</strong></td>
<td><strong>Healthcare-associated Severe sepsis/shock</strong></td>
<td><strong>Preferred:</strong> Piperacillin-tazobactam 4.5g IV over 30 minutes, then q8hr over 4 hours</td>
<td>CBC with diff, BMP, blood culture x2, wound culture and gram stain (ensure no superficial cultures)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>For confirmed penicillin allergy:</strong> Cefepime 1g IV q6hr PLUS metronidazole 500 mg IV q8hr</td>
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<tr>
<td></td>
<td></td>
<td><strong>For confirmed penicillin AND cephalosporin allergy, OR confirmed history of ESBL:</strong></td>
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<td></td>
<td></td>
<td>Meropenem 500 mg IV q6hr</td>
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<td></td>
<td></td>
<td><strong>If surgical wound infection with MRSA risk factors, add:</strong> Vancomycin 25 mg/kg IV x1</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(max 2g), then pharmacokinetic dosing service (PKDS)</td>
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</table>
## References and Appendices

<table>
<thead>
<tr>
<th>Suspected infection source</th>
<th>Risk factors</th>
<th>Recommendations: Antibiotics</th>
<th>Recommendations: Additional studies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pneumonia</strong></td>
<td>Community-acquired pneumonia</td>
<td><strong>Preferred:</strong> Ceftriaxone 1g IV q24hr PLUS azithromycin 500 mg IV/PO q24hr</td>
<td>CBC with diff, BMP, CXR, blood culture, sputum culture, Legionella urinary antigen</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>If allergy/intolerance to azithromycin:</strong> Ceftriaxone 1g IV q24hr PLUS doxycycline 100 mg IV/PO q12hr</td>
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<tr>
<td></td>
<td></td>
<td><strong>For confirmed penicillin and cephalosporin allergy:</strong> Levofloxacin 750 mg IV/PO q24hr</td>
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<tr>
<td></td>
<td></td>
<td><strong>If MRSA risk factors (necrotizing pneumonia, recurrent MRSA infections, postinfluenza infection) present, add:</strong> Vancomycin 25 mg/kg IV x1 (max 2g), then PKDS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hospital-acquired pneumonia or ventilator-</td>
<td><strong>Preferred:</strong> Cefepime 1g IV q6hr</td>
<td>CBC with diff, BMP, CXR, blood culture, sputum culture</td>
</tr>
<tr>
<td></td>
<td>associated pneumonia or structural lung disease</td>
<td><strong>Secondary option:</strong> Piperacillin-tazobactam 4.5g IV over 30 minutes, then q8hr over 4 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>For confirmed penicillin and cephalosporin allergy:</strong> Meropenem 500 mg IV q6hr</td>
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<tr>
<td></td>
<td></td>
<td><strong>If MRSA risk factors (necrotizing pneumonia, recurrent MRSA infections, postinfluenza infection) present, ADD:</strong> Vancomycin 25 mg/kg IV x1 (max 2g), then PKDS</td>
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<td><strong>If double gram-negative coverage due to high risk for MDROs necessary, add:</strong> Tobramycin 7 mg/kg IV x1, then PKDS</td>
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<td><strong>Skin/soft tissue infection</strong></td>
<td>Nondiabetic</td>
<td><strong>If high streptococcal risk, low MRSA risk:</strong> Cefazolin 1-2g IV q8hr</td>
<td>CBC with diff, BMP, blood culture x2, wound culture and gram stain (ensure no superficial cultures)</td>
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<td><strong>If MRSA risk factors present:</strong> Vancomycin 25 mg/kg IV x1 (max 2g), then PKDS</td>
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<td>Diabetic/severe sepsis/septic shock/necrotizing</td>
<td><strong>Preferred:</strong> Piperacillin-tazobactam 4.5g IV over 30 minutes, then q8hr over 4 hours PLUS vancomycin 25 mg/kg IV x1 (max 2g), then PKDS</td>
<td>CBC with diff, BMP, blood culture x2, wound culture and gram stain (ensure no superficial cultures)</td>
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<td>infection</td>
<td><strong>For confirmed penicillin allergy:</strong> Cefepime 1g IV q6hr PLUS metronidazole 500 mg IV q8hr PLUS vancomycin 25 mg/kg IV x1 (max 2g), then PKDS</td>
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<td><strong>For confirmed penicillin and cephalosporin allergy:</strong> Meropenem 500 mg IV q6hr PLUS vancomycin 25 mg/kg IV x1 (max 2g), then PKDS</td>
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### References and Appendices

<table>
<thead>
<tr>
<th>Suspected infection source</th>
<th>Risk factors</th>
<th>Recommendations: Antibiotics</th>
<th>Recommendations: Additional studies</th>
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<tbody>
<tr>
<td><strong>Urinary source</strong></td>
<td>Acute pyelonephritis/ low risk for MDROs</td>
<td><strong>Preferred:</strong> Ceftriaxone 1g IV q24hr&lt;br&gt;<strong>For confirmed penicillin and cephalosporin allergy:</strong> Ciprofloxacin 400 mg IV q12hr</td>
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<td>Acute pyelonephritis/ high risk for MDROs</td>
<td><strong>Preferred:</strong> Cefepime 1g IV q6hr&lt;br&gt;<strong>Secondary option:</strong> Piperacillin-tazobactam 4.5g IV over 30 minutes, then q8hr over 4 hours&lt;br&gt;<strong>For confirmed penicillin and cephalosporin allergy:</strong> Ciprofloxacin 400 mg IV q12hr PLUS gentamicin 5 mg/kg IV x1&lt;br&gt;<strong>For known history of ESBL:</strong> Meropenem 500 mg IV q6hr</td>
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<td><strong>Febrile neutropenia</strong></td>
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<td><strong>Preferred:</strong> Cefepime 1g IV q6hr&lt;br&gt;<strong>Secondary option:</strong> Piperacillin-tazobactam 4.5g IV over 30 minutes, then q8hr over 4 hours&lt;br&gt;<strong>For confirmed penicillin and cephalosporin allergy:</strong> Meropenem 500 mg IV q6hr&lt;br&gt;<strong>If the following risk factors are present (known history of MRSA, infiltrates on CXR/ pneumonia, suspected line infection, SSTI or hemodynamic instability), add:</strong> Vancomycin 25 mg/kg IV x1 (max 2g) then PKDS</td>
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<tr>
<td><strong>Unknown source</strong></td>
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<td><strong>Preferred:</strong> Cefepime 1g IV q6hr&lt;br&gt;<strong>Secondary option:</strong> Piperacillin-tazobactam 4.5g IV over 30 minutes, then q8hr over 4 hours&lt;br&gt;<strong>For confirmed penicillin and cephalosporin allergy:</strong> Meropenem 500 mg IV q6hr&lt;br&gt;<strong>If the following risk factors are present (known history of MRSA, infiltrates on CXR/ pneumonia, suspected line infection, SSTI or hemodynamic instability), add:</strong> Vancomycin 25 mg/kg IV x1 (max 2g) then PKDS</td>
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