Actionable Patient Safety Solutions (APSS) #9A:

Early detection & treatment of sepsis for high-income countries

How to use this guide

This guide gives actions and resources for creating and sustaining safer sepsis management in patients. In it, you'll find:

Patient Safety
M O V E M E N T

Executive summary checklist

Sepsis is a growing threat worldwide. At least 10-15% of sepsis deaths could be prevented through vaccination and hygienic measures, early detection and prompt treatment (World Sepsis Day Head Office, 2014)

Use this checklist to help you prioritize your actions and measure your organization's progress in detecting and treating sepsis in high-income countries:

Create an action plan

- ☐ Create a team approach to implement a protocol for early sepsis identification and treatment, including representation from patients, family members, advocates, administrators, nurses, providers, pharmacists, healthcare informaticists, physical and rehabilitation therapists, respiratory therapists, emergency responders, and laboratory staff.
- ☐ Create a sepsis dashboard with process and outcome measures.

Put systems in place

- ☐ Implement a Sepsis Rapid Response Team or incorporate early detection of sepsis into your existing medical emergency teams (e.g. rapid response team) (Nguyen, et al., 2016)
- ☐ Formalize processes to screen and rescreen patients for signs of sepsis throughout the entire institution
  - ☐ On presentation, take a detailed past medical history of sepsis or other severe infectious processesKnow if patient was ever previously diagnosed or treated for sepsis.
- ☐ Use automated electronic screening and documentation of process of care, based on existing data (SIRS criteria, MEWS or any other warning system being used)
- ☐ Design a workflow specific to level of alert:
  - ☐ Screening: SIRS/Sepsissevere sepsis/Septic shock workflow
  - ☐ Mortality prediction: qSOFA (or "Level of Risk")
- ☐ Create a protocol for rapid assessment and intervention at the bedside and use sepsis bundles (3-hour elements) For a higher level of care, use septic shock bundle (6-hour elements)
- ☐ Create a standard approach for review of process/protocol adherence trends and issues

Engage staff and track data on your progress

- ☐ Use patient stories – in written and video formats – to identify gaps and inspire change in your team
- ☐ Implement onboarding and continuing education for staff and providers.
- ☐ Create a process to report sepsis performance of the organization to their team (awareness of sepsis dashboard results).
- ☐ Implement an effective monitoring and screening system to accomplish continuous monitoring and early detection, based on existing data (SIRS criteria, MEWS, or any other warning system being used)
- ☐ Utilize your EHR as a data collection tool and source for predicting risk of sepsis for patients – a system that provides a data collection tool and allows for continuous analysis

and surveillance will be most beneficial

- [ ] Create a process for continuous monitoring of electronic systems and protocols, including compliance, efficacy, and outcome measures

What we know about sepsis

According to The International Consensus Definitions for Sepsis and Septic Shock:

- **Sepsis** is a "life-threatening organ dysfunction due to a dysregulated host response to infection"

- **Septic shock** is a "subset of sepsis where underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality"

  Clinical criteria for identifying this condition include:

  - The need for vasopressors to maintain a MAP≥ 65 mmHg

    Source: An increase in lactate concentration > 2 mmol/L, despite adequate fluid resuscitation (Singer, Deutschman , & Seymour, 2016; Review of the Sepsis- 3 Articles, 2016)

Sepsis is a growing threat worldwide, and the most common cause of death in U.S. hospitals:

- CDC estimates that 1.7 million adults in the U.S. develop sepsis every year (Data & Reports, 2016)

- At least 10-15% of sepsis deaths could be prevented through vaccination and hygienic measures

- Severe sepsis is estimated to affect 27 to 30 million people worldwide and has a 28.6% mortality rate – it kills more people than stroke and pneumonia (GSA, 2019).

- As many as 87% of sepsis cases originate in the community (Rhee, 2017)

- Nationally, mortality rates for sepsis cases entering the hospital through the emergency department range from 20% to more than 50%

The problems with delayed sepsis detection

Mortality from sepsis increases by as much as 8% for every hour that treatment is delayed. As many as 80% of sepsis deaths could be prevented with rapid diagnosis and treatment (Kumar, et al., 2006). A more recent study estimates a 4 percent increase in the odds of in-hospital mortality odds with each hour of antibiotic delay. (Seymour CW, Gesten F, Prescott HC, et al. N Engl J Med. 2017;376(23):2235-2244.)

Preventing morbidity and mortality through early detection of sepsis

It has become increasingly apparent that there is a long delay in both the recognition of sepsis and the initiation of appropriate therapy in many patients. This translates into an increased incidence of progressive organ failure and a higher mortality. Healthcare providers, therefore, need to have a high index of suspicion for the presence of sepsis and must begin appropriate interventions quickly.

Early detection of sepsis, with the timely labs, blood cultures, administration of appropriate fluids and antibiotics, appear to be the most important factors in reducing morbidity and mortality from sepsis.

Hospitals and healthcare institutions need to do all that is practicable to eliminate hospital-acquired infections.

The evidence for early detection of sepsis

Multiple instruments have been developed to screen for sepsis (Kumar et al., 2006; Ferrer et al.,

2009; Álvaro Castellanos-Ortega et al., 2010).

The Evaluation for Severe Sepsis Screening Tool, developed by the Surviving Sepsis Campaign and the Institute for Healthcare Improvement, consists of several components (Surviving Sepsis Campaign, 2012):

- A suspected or confirmed infection: checklist of common sites of infection

- Signs/symptoms of SIRS: temperature >38.3°C or <36°C, heart rate >90 beats/min, respiratory rate >20 breaths/min, acutely altered mental status, white blood cell count >12,000 µL (or 12 K/µL) or <4000 µL (or 4 K/µL)

- Signs of organ dysfunction/tissue hypoperfusion: systolic blood pressure <90 mmHg or decrease >40 mmHg from baseline, mean arterial pressure <70 mmHg, pulmonary infiltrates with increasing oxygen requirements to maintain SpO2 >90%, creatinine >2.0 mg/dL, bilirubin >2 mg/dL, platelet count <100,000/µL (or 100 K/µL), coagulopathy, or lactate >2 mmol/L

- Decrease in urine output and skin changes (mottling) or prolonged capillary-refill time

A team approach is essential to develop a protocol for sepsis identification and treatment in the patient care unit/department/hospital. Early detection of sepsis predicates early care interventions that impact patient outcomes. Compliance with early goal directed bundle of care elements is associated with lower mortality rates in patients with sepsis (Rhodes, et al., 2015). Three more recent large trials evaluating the early goal directed bundle of care elements all reported low mortality rates (Nguyen, et al., 2016). Successful quality improvement implementation requires participation by frontline clinicians, leadership and the interdisciplinary team's key stakeholders.

Important considerations

A patient may present to the health care provider or emergency room with vital signs in a normal range, it is still important to fully assess the patient. Vital signs may be in normal range, but may not be normal for that patient if they are on other medications that can artificially lower BP, HR, etc that can look like normal values. The provider should be looking for a possible source of infection: cough, painful urination, reddened, warm to touch rash or skin irritation. A medication history along with asking the patient how they are feeling can open the door to the provider to begin to make a differential diagnosis. An important juncture for patient family teaching is at any transition of care point: transfer to inpatient setting or discharge home. The patient and family need to know that any change in clinical symptoms including but not limited to: fever (hypothermia and hyperthermia), chills, confusion, weak and general malaise they should be instructed to contact their healthcare provider immediately or return to the emergency room. In a matter of hours a patient's condition can decline or become critical even after screening negative for sepsis and being discharged.

All surgical patients and departments regardless of the type of surgery need to know the signs and symptoms of infection and sepsis. Patients who have had urinary catheters, intra-venous line, endotracheal tube (breathing tube) are also at risk for sepsis.

Leadership plan

Hospital governance, senior administrative leadership, clinical leadership, and safety/risk management leadership need to work collaboratively to reduce sepsis. To achieve a goal of zero preventable deaths, leaders need to commit to taking these key actions:

Show leadership's commitment to a plan for early sepsis detection

- Evaluate their current performance regarding early sepsis detection and appropriate management in their healthcare system - use a questionnaire to gauge their level of readiness for a Sepsis Early Detection & Treatment Program **(Appendix A)**
- Create a plan based on the fundamentals of change outlined in the National Quality Forum safe practices, including awareness, accountability, ability, and action (NQF, 2010)
- Hospital governance, senior administrative leadership, and clinical/safety leadership must create a comprehensive approach to address their performance gap (from strategy to evaluation), including:
  - o Collect baseline process and outcome data
  - o Create measurable quality indicators and a timeline – "Some is not a number. Soon is not a time."
- Clinical/safety leadership should endorse the plan and drive implementation across all providers and systems

Create the infrastructure needed to make changes

- Governance boards and senior administrative leaders should approve specific budget allocations for the plan
- Train a Sepsis Coordinator to implement and evaluate the sepsis program for the multidisciplinary team throughout the facility
- Train prehospital and hospital personnel – use and evaluate prehospital and hospital care protocols
- Use patient stories – in written and video form – to identify gaps and inspire change in your board and staff. Stories from your own organization are particularly powerful. Other examples of free stories that can be used are listed below:
  - o Gabby Galbo: **http://patient.sm/XXlliC/**
  - o Kate Hallisy: **http://patient.sm/aRat0K**
  - o Nile Moss: **http://patient.sm/o6rlNW**
  - o Joshua Nahum's story: **http://patient.sm/wF5I1W**
  - o Rory Staunton: **http://patient.sm/Tbqo5S**
  - o Sepsis Alliance Faces of Sepsis Video: **http://patient.sm/vn5Zkk**

Action plan

Create an automated surveillance system

- Use an effective electronic surveillance system to improve early recognition of septic patients based on monitoring of the following data:
  - o SIRS criteriaTemperature > 38.3 C or < 36 C
    - HR > 90/min or greater than 2 SD above normal for age
    - RR > 20 breaths/min
    - WBC (< 4,000 or > 12,000 or > 10% bands)
    - Glucose > 140 mg/dL or 7.7 mmol/L in the absence of diabetes
  - o Markers of organ dysfunction

- Tissue perfusion: lactate > 2 mmol/L
- Cardiovascular: SBP < 90 mmHg or MAP < 70 mmHg or decrease in SBP > 40 mmHg
- Hepatic: Tbili > 2 mg/dL, INR > 1.5
- Renal: Cr increase > 0.5 mg/dL or 44.2 umol/dL from baseline or urine output < 0.5 mL/kg/hr for at least 2 hours despite adequate fluid resuscitation
- Pulmonary: PaO2 < 60 mmHg or SpO2 < 90 % or PF ratio < 200
- Coagulation: Platelets < 100,000 uL-1 or aPTT > 60 sec
  - o Other
    - Plasma C reactive protein > 2 SD above normal
    - Plasma procalcitonin > 2 SD above normal

Create protocol for screening

- Formally assess opportunities to identify sepsis and to improve outcomes for those patients that acquire and are at risk for sepsis (**Figure 1**)
  - o Implement strategies that will identify an early sepsis warning
  - o Implement systematic protocols for early identification and time-sensitive evidence-based treatment of sepsis (Rhodes et al., 2015)
- Formalize a process to screen patients for signs of sepsis throughout the entire institution
- Implement a sepsis response team or incorporate early detection of sepsis into existing medical emergency teams (e.g. rapid response teams)
  - o Identify the opportunities for implementation of a sepsis response team and protocol for initiating a sepsis response call for patients who have been identified as potentially septic
- Screen the workflow specific to the type and level of alert:
  - o 2 SIRS criteria met:
    - Temperature >38.3°C or <36°C
    - Heart rate >90 beats/min
    - Respiratory rate >20 breaths/min
    - White blood cell count >12,000 μL (or 12 K/μL) or <4000 μL (or 4 K/μL)
  - OR
  - o Clinically assess organ dysfunction: altered mental status, respiratory failure (dyspnea, elevated respiratory rate, desaturation), hypotension (systolic blood pressure <90 mmHg or decrease >40 mmHg from baseline, mean arterial pressure <70 mmHg)
    - Assess for infection, if patient has a source of infection
- Start sepsis protocol and assess if patient has other organ dysfunctions (laboratory dependent):
  - o Lactate >2 mmol/L
  - o Decrease in urine output or acutely increased creatinine
  - o Bilirubin >2 mg/dL
  - o Platelet count <100,000/μL (or 100 K/μL) or coagulopathy

- If organ dysfunction is present (i.e. severe sepsis), start sepsis bundle (or septic shock bundle) as per the Treatment Section below
- If qSOFA is positive (2 of the following - altered mental status (Glasgow coma scale < 15), respiratory rate ≥ 22/min, systolic blood pressure ≤ 100 mmHg) then increase monitoring and assess for ICU admission (qSOFA, n.d.)
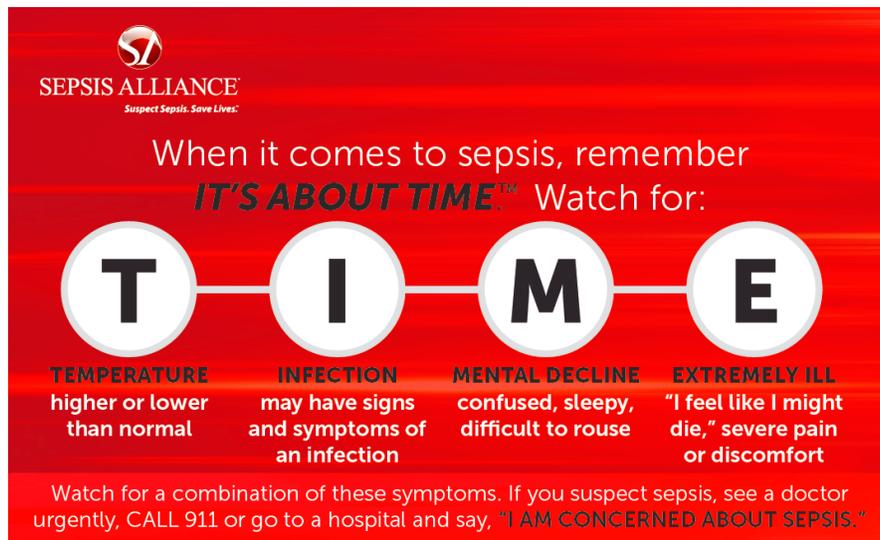

Figure 1: Graphic Courtesy of Sepsis Alliance

Create protocols for communication

- Use standardized protocols for patient/family engagement/communication, including:
    - o Coordinate with family or caregiver to reduce sepsis risk factors and identify clinical indicators at first sign
    - o Disclose all sepsis related events
    - o Provide an explanation as to why and how the sepsis occurred
    - o Explain how the effects of sepsis will be minimized
    - o Discuss/state steps that the caregiver or organization will take to prevent recurrences of sepsis

Use treatment and intervention best practices

- Adhere to the Surviving Sepsis Campaign practices
- Formalize workflows for clinicians to adhere to after a patient sepsis alert has been noted:
    - o For sepsis, implement workflow for rapid assessment and intervention at the bedside and initiate sepsis bundle (3 hour elements). Even though CMS calls this the 3 hour bundle it is important to get these items completed as quickly as possible.
    - o Obtain blood cultures prior to administration of antibiotics
    - o Administer broad spectrum antibiotics
    - o Administer 30 mL/kg crystalloid for hypotension or lactate ≥4 mmol/L
    - o Remeasure lactate if initial lactate was elevated
- For septic shock, implement workflow for rapid assessment, intervention, and need for higher level of care and initiate septic shock bundle (6 hour elements):
    - o Apply vasopressors (for hypotension that does not respond to initial fluid

resuscitation to maintain a mean arterial pressure (MAP) ≥65 mmHg)

- o In the event of persistent hypotension despite volume resuscitation (septic shock) or initial lactate ≥4 mmol/L (36 mg/dL), re-assess volume status and tissue perfusion and document findings:
  - Either:
    - o Repeat focused exam (after initial fluid resuscitation) by licensed independent practitioner can including vital signs, cardiopulmonary, capillary refill, pulse and skin findings. Or document sepsis reassessment completed.
  - Or 1 of the following:
    - o Measure CVP
    - o Measure ScvO2
    - o Bedside cardiovascular ultrasound
    - o Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge
  - o Consider remeasuringe lactate level regardless of initial lactate level

Monitor for Post Sepsis Syndrome

Post Sepsis Syndrome (PSS) affects up to 50% of sepsis survivors, leaving them with physical and/or long terms effects after a sepsis hospitalization (Prescott & Angus, 2018). These effects include insomnia, nightmares, vivid hallucinations and panic attacks, disabling muscle and joint pains, extreme fatigue, poor concentration, decreased cognitive functioning, and loss of self-esteem.

Almost 60% of sepsis survivors experience worsened cognitive and/or physical function. [3] Older sepsis patients experience on average 1 to 2 new limitations on activities of daily living, such as bathing, dressing, or managing money, after hospitalization.[3] In addition, one-sixth of sepsis survivors experience difficulties with memory, concentration, and decision making.[2] Many sepsis survivors also report symptoms of post-traumatic stress disorder.[6]

Sepsis survivors are also at increased risk for rehospitalization. About one-third of all patients have another hospitalization within three months of the initial sepsis, most commonly due to a repeat episode of sepsis or another infection.[1,2] The higher risk of infection following sepsis results from suppression of the immune system in the first few weeks and months following the initial bout of sepsis.[1,5] In addition to infection, other common causes of rehospitalization after sepsis are heart failure, kidney failure, and pulmonary aspiration.[2]

Informing sepsis survivors of their increased risk of hospital readmission and the potential for post-sepsis effects can improve outcomes.[1,2] Patients can be alerted to the be watchful of the onset of new infection and recurrent sepsis. They can also take steps towards rehabilitative treatments in the form of physical and occupational therapies that may improve recovery from sepsis.

Offer sepsis resources to the public

Innovative ways to engage patients and families as safety partners are critical to improve sepsis awareness and ultimately improve outcomes. Health care advocates have long supported patient education and engagement as a means to reduce the incidence of all medical events, including sepsis. A significant struggle is the public's lack of awareness of the existence and the prevalence and seriousness of sepsis, which hinders their ability to recognize and report early signs of the disease. Thirty-five percent (35%) of U.S. adults have NEVER heard of sepsis (Sepsis Alliance, 2019).

Information, resources and support need to be provided to the community to help know the symptoms of sepsis and that it is a medical emergency. Helping the public develop basic skills and confidence and providing them with appropriate support both during and after a sepsis diagnosis is the key to reducing injuries and deaths from sepsis. Sepsis survivors and their loved ones need assistance to cope during the immediate recovery period and to know what to expect during the often times protracted post-sepsis healing process. Resources to share with the public include:

- **Sepsis Alliance** resources:
  - Sepsis 911 Education Toolkit to raise sepsis awareness in your community: **http://patient.sm/TzrdPp**
  - Resources for those diagnosed with sepsis: **http://patient.sm/f153Mg**
  - If a loved one has sepsis: **http://patient.sm/1qrNZu**
  - Life after sepsis: **http://patient.sm/1qrNZu**
  - Sepsis Information Guides: **http://patient.sm/QOs9fh**
  - Share your story on Faces of Sepsis: **http://patient.sm/MORel9**
- **Engaged Patients** (Empowered Patient Coalition) Empowered Patient Signs of Sepsis Fact Sheet (free with registration): http://engagedpatients.org/empowered-patient-signs-sepsis-fact-sheet/
- Sepsis resources from the **Centers for Disease Control and Prevention (CDC)**: http://www.cdc.gov/sepsis/basic
- **National Institutes of Health (NIH)** Sepsis Fact Sheet: https://www.nigms.nih.gov/education/pages/factsheet_sepsis.aspx

Other useful resources for your organization

- **Sepsis Alliance** resources
  - Video for Emergency Medical Service (EMS) personnel to learn to rapidly identify and treat sepsis in the field as well as how to effectively coordinate with the emergency department and in-hospital team: **http://patient.sm/yvmbvU**
  - Sepsis Coordinator Network: **http://patient.sm/AviFPK**
  - Sepsis: Across the Continuum of Care webinars for healthcare professionals: **http://patient.sm/For2zb**
  - Sepsis 911 Education Toolkit to raise sepsis awareness in your community: **http://patient.sm/1arOcY**
  - Life after sepsis: **http://patient.sm/dXDFGC**
  - Posters and infographics: **http://patient.sm/WBKkrO**
  - The Sepsis Institute - continuing education on sepsis for healthcare providers: **http://patient.sm/UrfHcY**
- Sepsis resources from the CDC: **http://patient.sm/KGTfcS**
- **Center for Medicare and Medicaid Services (CMS)** Webinar: SEP-1 Early Management Bundle, Severe Sepsis/Septic Shock: v5.3a Measure Updates **http://patient.sm/oclDrQ**
- **Surviving Sepsis Campaign**: **http://patient.sm/nzBJdH**

Technology plan

These suggested practices and technologies have shown proven benefit or, in some cases, are the only known technologies for certain tasks. If you know of other options not listed here, please complete the form for the PSMF Technology Vetting Workgroup to consider: **http://patient.sm/zW1G7p**

System or Practice	Available technology
Electronic Health Record (EHR)	• An algorithm-driven biomarker using basic patient chart information routinely available in the EHR. This algorithm allows adaptation to site-specific data by training the model with baseline data from the proposed implementation center. Across two recent studies, the algorithm score had a sensitivity and a specificity of 0.83 and 0.96, respectively, for sepsis. These results show promise for the early detection of sepsis in adult and pediatric patients (Mao et al., 2017).
Continuous pulse oximetry	• Adhesive pulse oximetry sensor connected with pulse oximetry technology proven to accurately measure through motion and low perfusion to avoid false alarms and detect true physiologic events, with added importance in care areas without minimal direct surveillance of patients
Real-time PCR (polymerase chain reaction)	• Multiplex target-specific real-time PCR/in situ hybridization/melt analysis to identify 25 of the most sepsis relevant pathogens using a 1.5-ml whole-blood sample within 6 h. Reported sensitivity of between 3 and 100 CFU per ml. Reported summary sensitivity and specificity of 68% and 86% (Sinha et al., 2018).

Integrated digital PCR/HRM (high-resolution melt) technology	• A rapid, broad-based microbial identification technology requiring blood samples of less than 1 ml. It can currently detect 37 bacterial pathogens with single-organism and single-genome sensitivity as well as resolve polymicrobial infections in <4 h. U-dHRM integrates universal digital PCR (dPCR) with high-resolution melt (HRM) analysis on a microfluidic chip to enable probe-free differentiation and quantification of bacteria within a sample. The speed and simplicity of U-dHRM along with its integrated technology platform suggest a promising first-pass screening method for neonatal sepsis. This technology also shows the potential to deliver at- or near-point-of-care diagnosis
Artificial Intelligence Methods	• The use of Artificial Intelligence (AI) to provide early identification of patients at high risk has shown great promise. The AI system continuously examines all data in the EMR to find combinations and trends indicating early signs or increased risk. Systems are in clinical use in both the US and Australia, with promising early results.

Measuring outcomes

Key performance indicators:
Life threatening organ dysfunction caused by a dysregulated host response to infection.

Sepsis Mortality Rate
Rate of mortality for severe sepsis and/or septic shock patients per 1000 patients with severe sepsis and/or septic shock.

Outcome measure formula:
Numerator:
Number of inpatient mortalities for patients with severe sepsis and/or septic shock

Denominator:
Total number of patients with severe sepsis and/or septic shock diagnosis codes that are admitted to the intensive care unit from the emergency department or from an acute floor setting

- *Rate is usually displayed as: Mortalities/1,000 Patients

Metric recommendations:

Direct impact:

All patients with severe sepsis and/or septic shock

Lives spared harm:

Lives Spared Harm = Mortality Rate$_{baseline}$ – Mortality Rate$_{measurement}$) X Patients$_{baseline}$

*Patients$_{baseline}$: the total number of patients that are counted with the diagnosis of severe sepsis and/or septic shock

Notes

Patients with severe sepsis or septic shock are determined by the following diagnosis codes:
- ICD-9
    - o 995.92 (Severe Sepsis)
    - o 785.52 (Septic Shock)
- ICD-10
    - o R65.20 (Severe sepsis without septic shock)
    - o R65.21 (Severe sepsis with septic shock)

Additionally, patients must be admitted to the intensive care unit from the emergency department or from an acute floor setting. If feasible, manual review of diagnosis codes is desirable due to the complex nature of sepsis.

If manual review is feasible, consideration may be given to include an ICD-9/ICD-10 diagnosis code: 995.91 (Sepsis)/A41.9 (Sepsis, unspecified organism) with an additional diagnosis for acute organ failure.

Data collection

Data may be pulled from electronic billing data with the above diagnosis codes. Additionally, data may be collected exclusively through manual chart review, or a hybrid method of chart review and electronic billing data.

Limitations

Sepsis mortality rates are derived by healthcare organizations differently. We recommend risk adjusting the outcome measure, in this case mortality, and consider exclusion criteria such as: DNR status, comfort care as goal of care established.

Settings

Intensive care units, emergency department, and acute floor settings.

Mortality (will be calculated by the Patient Safety Movement Foundation):

The PSMF, when available, will use the mortality rates associated with Hospital Acquired Conditions targeted in the Partnership for Patient's grant funded Hospital Engagement Networks (HEN). The program targeted 10 hospital acquired conditions to reduce medical harm and costs of care.

"At the outset of the PfP initiative, HHS agencies contributed their expertise to developing a measurement strategy by which to track national progress in patient safety – both in general and specifically related to the preventable HACs being addressed by the PfP. In conjunction with CMS's overall leadership of the PfP, AHRQ has helped coordinate development and use

of the national measurement strategy. The results using this national measurement strategy have been referred to as the 'AHRQ National Scorecard,' which provides summary data on the national HAC rate" (AHRQ, 2015).

Conflicts of interest disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Some of the APSSs recommend technologies offered by companies involved in the Patient Safety Movement Foundation. The workgroups have concluded, based on available evidence, that these technologies work to address APSS patient safety issues. Workgroup members are required to disclose any potential conflicts of interest.

Workgroup

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Appendix A: Sepsis early detection and treatment program questionnaire

Organization query

1. Demographics: hospital bed count; type: community, academic; Electronic Health Record vendor
2. Are there dedicated resources for a Sepsis Program/Sepsis as quality measure?
   a. Does your hospital have a defined sepsis program? Y/N
   b. Is there dedicated staff to lead the sepsis program? Y/N
   c. What department is the program housed within? Quality, Nursing, Central hospital administration, others?
3. Is there ongoing formal sepsis education offered for
   a. Nurses
   b. Physicians, NPs/PAs
   c. Allied health team members (Pharmacists, Rehab Therapists, Respiratory Therapists, et al.)

Sepsis screening and surveillance

1. Does your hospital have a standardized surveillance or routine screening process for early detection of sepsis, severe sepsis, and/or septic shock? Y/N/NA   If yes, see below:
   a. Locations that have standardized surveillance: ED, urgent care, acute care, transitional care, ICU, other
   b. Is there an automated continuous surveillance of data in electronic health record? Y/N
      i. Who receives alerts? –RN, MD, Pharmacy, Rapid response clinicians others, all
      ii. What action does the alert prompt/activate? –Notification instructions, bringing clinicians to see patient, orders for care diagnostics or interventions, other
   c. Is there intermittent routine screening by clinicians/nurses using a standardized process e.g. sepsis checklist, section of assessment flow-sheet, etc.?
      i. What is the frequency of intermittent screening? Every 8 hrs, 12 hrs, 24 hrs, and/or PRN change in patient condition
      ii. What action does the intermittent screening result prompt/activate? Notification instructions, bringing clinicians to see patient, orders for care diagnostics or interventions, other
2. Does your Emergency Department have an active surveillance or routine screening process for early detection of sepsis, severe sepsis, septic shock? Y/N/NA
   a. If yes, is it electronic-based? Y/N
3. Does your Urgent Care Department have an active surveillance or routine screening process for early detection of sepsis, severe sepsis, septic shock? Y/N/NA
   a. If yes, is it electronic-based? Y/N

Sepsis management

1. Does your hospital have a standardized sepsis care bundle as part of a protocol, policy, order set? Yes/No/NA

a.　If Yes, see below:

　i. Which of the following are included in your sepsis care bundle?

　　　1.　Obtain lactate level

　　　2.　Obtain blood cultures/other cultures (urine, CSF, wound, etc.) before antimicrobial agent administration

　　　3.　Administer broad-spectrum antimicrobial agents within 1 hour of time of presentation (for inpatients) or within 3 hours of time of presentation (for ED patients)

　　　4.　Administer IV fluid challenge for hypotension or lactate ≥ 4 mmol/L

　　　5.　Administer vasopressor medications to maintain MAP ≥ 65 mmHg after IV fluid challenge and within 6 hours of time of presentation

　　　6.　Obtain a follow up lactate level if initial lactate was elevated (>2), to evaluate resuscitation interventions (Target is normalization of lactate level)

　　　7.　If persistent hypotension, after 1-hour from completion of the 30 mL/kg IV fluid challenge resuscitation or lactate ≥ 4 mmol/L, measure CVP and/or Scv02 levels (Target is CVP 8-12 mmHg, Scv02 of ≥70% -these targets are being debated based on recent trial results –ARISE, PROCESS, PROMISE)

Measurement

What are the metrics used? What are the measurement procedures (manual, automated reports, etc.)? Where are measurement data reported to?

　　1.　Screening compliance, screening tool accuracy (sensitivity/specificity)

　　2.　Sepsis care/management bundle compliance

　　　a.　CMS National Hospital Inpatient Quality Measure

　　　b.　Reporting based on hospital discharges October 2015

　　3.　Outcomes

　　　a.　Sepsis-associated mortality (hospital)

Person and family engagement

　　1.　Are materials or resources (website, classes, pamphlets, videos, etc.) available for patients and families regarding:

　　　a.　Sepsis – what it is, risks, prevention, early detection, management, possible trajectory (ICU, post-ICU), outcomes –post-hospital resources

　　　　i.　How you, as the patient or family member, can participate in prevention and early detection

　　　b. The hospital's sepsis program –what, when, who, etc.? e.g. screening, code sepsis, etc.

　　　c.　For hospitals without a sepsis program – Do you have a rapid response team or a Condition H program?

　　　d. Is your rapid response or Condition H also patient-activated?

　　　e. How are patients and families alerted and oriented to the rapid response system?

　　　f.　Which provider or department is the contact point if the patient or family suspects infection or sepsis after discharge?

Post Sepsis Syndrome Resources

CDC Life after sepsis fact sheet https://www.cdc.gov/sepsis/pdfs/life-after-sepsis-fact-sheet.pdf

Sepsis Alliance Post-Sepsis Syndrome Page - information about post sepsis syndrome for patients and families, including a downloadable letter to healthcare professionals and others (teachers, coaches) to explain the syndrome. https://www.sepsis.org/sepsis-basics/post-sepsis-syndrome/

 The UK Sepsis Trust https://sepsistrust.org/get-support/support-for-survivors/post-sepsis-syndrome/

JAMA Patient Page on Postsepsis Morbidity https://jamanetwork.com/journals/jama/fullarticle/2667724