

# ADVANCING SEPSIS CARE IN EMERGENCY MEDICINE

RECOMMENDATIONS FROM A TASK FORCE TO IMPROVE  
SCREENING AND TREATMENT PROTOCOLS



Massachusetts  
**Sepsis**  
Consortium

APRIL 2019

## **ABOUT THE MASSACHUSETTS SEPSIS CONSORTIUM**

The Massachusetts Sepsis Consortium is a multi-stakeholder initiative aimed at reducing sepsis-related morbidity and mortality in Massachusetts. Convened by the Betsy Lehman Center for Patient Safety, the Consortium includes leaders from all sectors of the state's diverse health care community. Together, its members are working to identify strategic opportunities to improve sepsis outcomes in the state and bring collective resources to bear on this complex and persistent public health challenge.

### **State Agencies and Legislators**

- Executive Office of Health and Human Services
- Betsy Lehman Center for Patient Safety
- Board of Registration in Medicine, Quality and Patient Safety Division
- Center for Health Information and Analysis
- Department of Public Health
- Health Policy Commission
- MassHealth
- Rep. Kate Hogan
- Sen. Jason Lewis
- Sen. Mark Montigny

### **Health Care Associations and Insurers**

- Blue Cross Blue Shield of Massachusetts
- CRICO
- Coverys
- Healthcentric Advisors
- Home Care Alliance of Massachusetts
- Massachusetts Association of Health Plans
- Massachusetts Coalition for the Prevention of Medical Errors
- Massachusetts Emergency Nurses Association
- Massachusetts Health and Hospital Association
- Massachusetts Home Care
- Massachusetts Infectious Disease Society
- Massachusetts Medical Society
- Massachusetts Senior Care Association
- Society of Critical Care Medicine
- Steward Health Care

### **Sepsis Advocates and Patient Representatives**

- National Family Council on Sepsis
- Rory Staunton Foundation
- Sepsis Alliance

## THE EMERGENCY DEPARTMENT SEPSIS PROTOCOLS TASK FORCE

As its first major initiative, the Massachusetts Sepsis Consortium launched a special task force to assess the current state of sepsis response in hospital emergency departments. The task force was also charged with developing recommendations for sepsis screening and treatment protocols in the emergency medicine setting, together with a set of evidence-based best practices and tools to help Massachusetts hospitals implement these protocols in their emergency departments and satellite emergency facilities.

The Consortium is grateful to the members of the task force, a diverse group of physicians, nurses and pharmacists with emergency department expertise as well as clinical researchers and patient representatives. Together, they brought expertise in emergency medicine, sepsis research, informatics, infectious disease and quality improvement. Members represent a wide range of health care organizations and hail from all regions of the Commonwealth. In addition to hours of their time spent preparing for and participating in monthly scheduled meetings, members were called on frequently to review documents, identify resources for the toolkit and participate in ad hoc subcommittee meetings. The Consortium is especially grateful to the two co-chairs who dedicated additional time to ensure the group's work was as responsive as possible to the needs of the emergency medicine community. The results of the task force members' diligent, thoughtful deliberations is reflected in this report.

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The Consortium and task force members would like to thank the following individuals and organizations for their help in compiling this report and supporting materials:

## KEY PARTNERS

We are grateful to the key partners on this project who supported it from the beginning and without whom it would not have been possible. Special thanks to the Massachusetts Health & Hospital Association and especially to Patricia Noga for helping the task force to complete the survey of all emergency facilities in Massachusetts. And thanks to the clinicians and staff representing all Massachusetts hospitals who made time to answer our questions and to contribute ideas and resources for improving sepsis care throughout the state.

- Center for Health Information and Analysis
- Massachusetts Department of Public Health
- Massachusetts Health Policy Commission
- Massachusetts Health & Hospital Association

## REVIEWERS

We also want to thank the careful readers who took the time to review the task force report and tools prior to publication.

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### **Patricia M. Noga, Ph.D., R.N.**

Vice President, Clinical Affairs  
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## TOOLKIT CONTRIBUTORS

Finally, we are indebted to several health care organizations that generously donated their tools and took time to share their stories for the case studies in the toolkit that accompanies this report.

- Anna Jaques Hospital
- Baystate Medical Center
- Berkshire Health Systems
- Boston Medical Center
- Children's Hospital Boston
- Children's Hospital Collaborative:  
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- Emerson Hospital
- Florida Hospital Association
- Greater New York Hospital Association
- Healthcentric Advisors
- Massachusetts General Hospital
- Lowell General Hospital
- Partners Health Care
- Signature Health Care Brockton
- Society of Critical Care Medicine
- Southcoast Health
- Stanford Health
- UMass Memorial Medical Center

## INTRODUCTION

Massachusetts has long been considered a health care “mecca” – a destination for those searching for state-of-the-art medical care, top flight health care providers and high quality medical education. And in many ways, it lives up to its reputation. Massachusetts hospitals consistently rank among the top five of hospitals in the U.S. in various specialties;<sup>1</sup> a network of academic medical centers across the Commonwealth trains thousands of medical residents each year;<sup>2</sup> and Massachusetts health indicators are better than most other states, landing the Commonwealth in the top five list among states in health outcomes, year after year.<sup>3</sup>

Yet, even in Massachusetts, persistent health quality and safety challenges remain that require the focused attention of stakeholders from across the Commonwealth. One such challenge is sepsis—the body’s extreme response to an infection that can lead to rapid tissue damage, organ failure and death if not treated quickly.<sup>4</sup> Massachusetts is a middling performer on nationally available sepsis indicators, where the state ranked 25<sup>th</sup> in mortality in 2017<sup>5</sup> and is at the national average in providing timely care for patients with sepsis.<sup>6</sup> Approximately 42,000 (6/1,000) Massachusetts residents are diagnosed with sepsis every year and an estimated 5,000-7,000 residents die from sepsis each year.<sup>7</sup> Sepsis is consistently among the top causes for 30-day hospital readmissions in all regions of Massachusetts,<sup>8</sup> and is the third-leading cause of the state’s hospital inpatient deaths.<sup>9</sup>

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Despite its toll, sepsis is not well-understood by the public with upwards of 35 percent of Americans reporting that they have never heard the word “sepsis.”<sup>10</sup> While awareness among health care providers is higher, the condition can be difficult to recognize and treat expeditiously because of its often vague clinical presentation.

Because about four out of five patients who are diagnosed with sepsis experience the onset of symptoms at home or at another site in the community, hospital emergency departments are key points of entry and intervention.<sup>11</sup> An emergency department’s preparedness to quickly recognize the symptoms of sepsis and begin treating a patient will often mean the difference between recovery, long-term disability, and death.

## SEPSIS IN THE U.S. AND MASSACHUSETTS

Sepsis contributes to more deaths in US hospitals each year than any other condition.<sup>12</sup> Approximately 1.7 million adult Americans are affected by sepsis each year, with 270,000 associated deaths.<sup>13</sup> In addition, more than 75,000 children are treated for sepsis each year in the United States with mortality rates ranging from 10-20 percent.<sup>14</sup>

Despite significant and concerted efforts to improve sepsis care over the last two decades, death from sepsis among adults remains remarkably high, ranging from 20-50 percent depending on severity of the case and individual co-morbidities.<sup>15</sup> In addition to the impact on patients and their families, sepsis is the most expensive condition to treat in the United States,<sup>16</sup> driving an average of \$24 billion in health care spending each year.<sup>17</sup>

Anyone can get sepsis, but some are at higher risk than others. Adults aged 65 or older, those with weakened immune systems, and individuals who have multiple chronic health conditions, such as diabetes, cancer, or kidney disease are at higher risk for developing sepsis.<sup>18</sup> Among pediatric patients, infants younger than 1 year old are at higher risk than older children.<sup>19</sup> According to the Centers for Disease Control and Prevention, the most common pathogens that lead to sepsis are *Staphylococcus aureus* (staph infections), *Escherichia coli* (E. coli), and certain types of *Streptococcus*.<sup>20</sup>

## A COLLECTIVE STATEWIDE RESPONSE: THE MASSACHUSETTS CONSORTIUM

Massachusetts health care providers, researchers, and state agencies have long pursued various initiatives targeting sepsis, but until recently there had been no coordinated statewide effort to improve sepsis awareness and response. Because the challenges associated with sepsis are numerous and complex, the state recognized the need for a longer term, systematic effort that will be carried out in phases over a period of several years. The Massachusetts Sepsis Consortium, a 30-organization group of public-private partners, came together with the collective goal of improving sepsis outcomes in the Commonwealth.

The Consortium began its work with a planning process to frame the key issues and set priorities based upon urgency and potential for impact—with a particular emphasis on challenges that will derive the greatest benefit from a coordinated approach or diffusion of best practices. The Consortium’s work will look beyond regulatory approaches toward identification and broad dissemination of quality and safety improvement strategies combined with activities that support implementation.

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*This report reflects the outcome of many months of task force deliberations, including a review of tools and best practices to improve sepsis care as well as new data collected about how sepsis is currently being diagnosed and treated in the state’s emergency departments.*

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Because the vast majority of people who develop sepsis experience their first symptoms at home or in another community setting, the emergency department represents an important point of intervention to improve outcomes. For that reason, in its first meeting the Consortium chose to launch an Emergency Department Sepsis Task Force to focus on improving early detection of and treatment of sepsis in the Massachusetts emergency departments. The Consortium directed the Emergency Department Sepsis Protocols Task Force to review available sepsis protocols, develop and disseminate recommendations and provide actionable tools and resources to support more widespread adoption of evidence-based sepsis protocols in Massachusetts hospitals.

This report reflects the outcome of many months of task force deliberations, including a review of tools and best practices to improve sepsis care as well as new data collected about how sepsis is currently being diagnosed and treated in the state’s emergency departments.

## FINDINGS

### A. Defining the challenges and opportunities

The task force began its work by framing the challenges of identifying and caring for patients who present to the ED with sepsis and opportunities for improvement.

#### Challenges of clinical presentation

Emergency department clinicians face many challenges in their efforts to accurately and efficiently diagnose and treat patients with sepsis. The symptoms of sepsis are often vague and may be easily confused with other, more benign conditions. Moreover, there is no objective standard diagnostic test that can be used for sepsis, so clinicians must look at a combination of abnormal vital signs, laboratory results, and patient-reported information to determine whether sepsis is a possibility. In addition, patients with sepsis can decline quickly so a patient who seemed only mildly sick at first may rapidly become critically ill, making reassessment important. Beyond the difficulties associated with diagnosis is the fact that treatment of sepsis requires the rapid administration of a number of therapies, including antibiotics and intravenous fluids and, in some cases, medications to help manage extremely low blood pressure. For every hour of delay in treatment, the risk of mortality for patients in septic shock increases by eight percent.<sup>21</sup>

#### Challenges of conflicting guidance

Diagnosis and treatment of sepsis is further complicated by a lack of clarity from subject matter experts and specialty societies regarding the definitions of sepsis and the most appropriate course of treatment. In 2004, the Surviving Sepsis Campaign (SSC) released the first international guidelines on sepsis care, offering a standardized, bundled approach to sepsis care and a call to action to reduce sepsis mortality by 25 percent.<sup>22</sup>

The SSC treatment guidelines, which are periodically updated, became the basis for the Early Management Bundle for Severe Sepsis/Septic Shock (SEP-1) quality measure promulgated by the Centers for Medicare and Medicaid Services (CMS) in 2015. The SEP-1 quality measure is part of the CMS Inpatient Quality Reporting Program and is the only national quality measure for sepsis. The quality measure is not currently used by CMS to determine payment, but CMS made it publicly available on the Hospital Compare website beginning in July 2018, which allows the public, researchers and providers to compare hospitals on various quality metrics. Since 2015, many hospital EDs have been focused on adapting their sepsis care processes to achieve compliance with the SEP-1 quality measure.

The SEP-1 measure requires hospitals to report clinical data on patients, aged 18 years or older, who have been diagnosed with sepsis, severe sepsis or septic shock, with some exclusions for patients with special circumstances, including, for example, those who are receiving comfort care, or those who are transferred from outside facilities.<sup>23</sup> For each patient, or for a sample of patients who meets CMS definitions, hospitals must report on 141 distinct actions related to the patient's care, requiring an extraordinary amount of documentation on the part of the clinical team as well as considerable effort by an abstractor to pull data out of a chart retrospectively.<sup>24</sup>

In early 2016, shortly after CMS finalized the SEP-1 quality measure, an international task force issued updated definitions for sepsis and septic shock. The updated definition, known as Sepsis-3, collapsed the categories of "sepsis" and "severe sepsis" into one, leaving only definitions for "sepsis" and "septic shock." It also recommended use of the Sequential Organ Failure Assessment (SOFA) to determine the presence of organ dysfunction, discarding the Sepsis-2 consensus use of systemic inflammatory response syndrome (SIRS) criteria plus evidence of infection as the appropriate clinical criteria.

The current conflict between CMS measure requirements (which still uses the SIRS criteria and Sepsis-1 and 2 definitions) and the latest clinical guidance from the Sepsis-3 task force illustrates the ongoing challenges that hospitals face as they seek to provide optimal care for their patients while also working to comply with regulatory requirements.

What's more is that other payers – including some of the largest private insurance companies – are beginning to adopt Sepsis-3 definitions, which could lead payers to deny claims from those hospitals complying with CMS because the documentation requirements for Sepsis-3 are completely different from what CMS requires.<sup>25</sup> The alternative, of course, is to adopt different coding and documentation workflows for sepsis patients based on the payer, but this is both resource-intensive and clinically impractical.

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#### **The opportunity: Implementing proven best practices in ED sepsis care for adults**

Despite these challenges, there are best practices on which most experts agree and for which there is well-established peer reviewed evidence. The task force focused on these aspects of care, and the recommendations below reflect areas of consensus where experts agree on practices that lead to a reduction in sepsis-related morbidity and mortality.

Evidence shows that the routine use of screening tools<sup>26</sup> at triage, followed by a blood lactate in patients with abnormal vital signs and suspected infection, are key steps to improving early identification of sepsis.<sup>27</sup> In addition, blood cultures should be drawn in order to determine the source of the underlying infection, allowing the clinical team to tailor antibiotics to treat the infection. Timely delivery of key treatments, particularly antibiotics,<sup>28</sup> and intravenous fluid resuscitation, has been shown to significantly reduce the risk of mortality.<sup>29</sup> As important is regular reassessment of patients to monitor their responsiveness to therapies that have been given. Clinicians should assess volume resuscitation adequacy, check for complications related to the administration of fluids,<sup>30</sup> and repeat a blood lactate at least 1-2 hours after fluid resuscitation begins.<sup>31</sup>

Best practices that help expedite recognition and treatment of sepsis have been studied and found to be effective in reducing sepsis mortality.

In particular:

- Use of nurse-driven protocols as a strategy to expedite treatment of patients with sepsis, including at least one study that documented reduced time to antibiotics.<sup>32,33,34</sup>
- Implementation of protocolized bundles of care for treatment of sepsis patients.<sup>35,36</sup>
- Regular education of hospital staff about sepsis to ensure that clinical staff is attuned to sepsis and prepared to act when the screening tool suggests a heightened risk.<sup>37</sup>
- Use of electronic health record (EHR) tools, such as automated screening tools and standardized provider order sets,<sup>38</sup> to both improve early recognition and increase adherence to sepsis care bundles.<sup>39,40</sup>

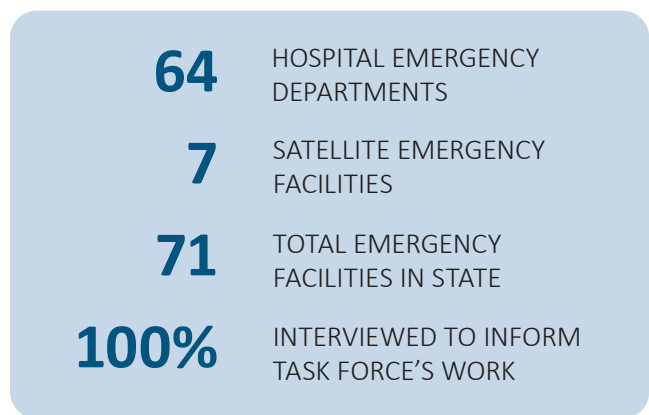
### B. Findings about the current state of sepsis care in Massachusetts emergency departments

In order to understand the current state of sepsis care in emergency medicine, the Betsy Lehman Center for Patient Safety completed a comprehensive key informant survey of Massachusetts emergency departments and satellite emergency facilities.<sup>41</sup> The goal of the interviews was to generate a baseline understanding of current practice. The information gathered also helped identify common challenges faced by hospital emergency facilities, informing the creation of useful tools and resources for sepsis care improvement in emergency departments.

In total, 64 hospitals in Massachusetts operate an emergency department.<sup>42</sup> In addition, there are seven satellite emergency facilities operating 24 hours a day, seven days a week, bringing the total number of facilities in the state to 71. Data was gathered on all 71 facilities for a response rate of 100 percent. The interview respondents included a range of personnel, from those working in the hospital quality department to emergency department directors, chief medical and nursing officers, pharmacists, infectious disease specialists and Intensive Care Unit (ICU) clinical team members. More often than not, interviews involved multiple staff to ensure that all of the survey questions

could be answered accurately. Of the 71 facilities completing interviews, seven were academic medical centers; one was a pediatric specialty hospital; 53 were regional medical centers or community hospitals; three were critical access hospitals; and seven were satellite emergency facilities.

The survey found that most emergency facilities reported having a screening tool and protocol in place for treating adult patients with sepsis. By contrast, only a few have adopted screening and treatment protocols for children with sepsis. Importantly, the survey also showed that adoption of best practices related to sepsis screening and treatment was uneven across hospitals. Finally, even though education of staff and feedback to clinical teams about adherence to protocols is critical to improving sepsis outcomes, many hospitals reported that they did not have a system in place to do this.



#### Adult sepsis screening and treatment

- 87 percent of hospital emergency departments and satellite ED facilities (n=62) in Massachusetts reported having an adult sepsis screening tool that is used by ED clinicians to identify patients with suspected sepsis.<sup>43</sup>
- Of the 62 facilities that have a screening tool, 51, or 72 percent, reported that the screening tool is incorporated into the facility's electronic health records (EHR) system.
- Most facilities use a combination of abnormal vital signs (SIRS criteria) along with infection risk to identify patients who may have sepsis, demonstrating that most continue to follow the CMS definitions of sepsis. Some facilities use a "shock index" or quick-SOFA criteria to screen for sepsis.



- 94 percent of ED facilities in Massachusetts (n=67) reported having treatment protocols in place to guide clinicians in the appropriate treatment of adult patients with suspected sepsis. Typically, this took the form of automated nurse and physician order sets that are programmed into the EHR.
- Many also said that they have a protocol for nurses to initiate key tests when they suspect a patient may have sepsis.
- Many hospitals reported that their work on sepsis had been driven in part by the focus of CMS on timely sepsis care. The federal requirements prompted many hospitals to review and update their sepsis policies and practices to align with the elements of the CMS SEP-1 bundle.

### Pediatric sepsis screening and treatment

- 94 percent of facilities (n=67) surveyed said they provide emergency care for children.
- Only 13 percent (n=9) of those that provide care for children reported having protocols for diagnosing and treating children with sepsis.
- Only two hospitals currently collect data on pediatric cases of sepsis.

### Sepsis data collection and feedback to clinicians

- 83 percent of facilities (59) reported that they are collecting data on cases of adult sepsis.
- All but a couple said their main data collection activities are directly related to the reporting requirements associated with CMS's SEP-1 measure.
- 32 percent of facilities (n=23) monitor additional indicators, such as sepsis-related mortality, inpatient length-of-stay, readmissions, or ICU length-of-stay data for sepsis patients.
- Several respondents reported that SEP-1 data collection is time-consuming and resource-intensive, leaving little additional resources to monitor other data related to sepsis.
- Of the hospitals that collect data on sepsis (n=59), 58 percent (n=34) reported that they provide feedback to ED clinicians about their compliance with the CMS sepsis bundle or other aspects of sepsis patient care. This feedback on performance is typically presented via email or during a regularly scheduled meeting.

### Successful strategies to improve sepsis care

Massachusetts emergency facilities reported using a number of strategies to improve sepsis care, including:

- Convening a multidisciplinary hospital or system-wide sepsis team to set policy, train staff and initiate quality improvement strategies
- Implementing nurse-driven protocols to expedite treatment of patients with suspected sepsis
- Implementing a sepsis order set for physicians to provide a list of evidence-based treatments for patients with suspected sepsis
- Incorporating alerts and tracking tools in the EHR system to improve identification of patients with early sepsis and monitor their treatment
- Engaging with their hospital's quality improvement team to coordinate, test and evaluate sepsis care improvement initiatives

### Challenges highlighted by hospitals

Massachusetts hospital emergency departments reported a number of challenges associated with providing high quality sepsis care, including:

- 89 percent (n=63) of respondents expressed negative views of the requirement to report on the CMS SEP-1 measure. Concerns expressed related to resource-intensity (e.g., the time required to collect data to report on the measure); specific measure elements (e.g., the fluid requirements); and a broader concern that improving SEP-1 measure performance did not lead to improved outcomes for patients based on the hospital's internal data.
- 29.5 percent of respondents (n=21) reported that the facility EHR system was a barrier to successful implementation of standardized screening and treatment protocols for a variety of reasons, including:
  - The EHR is outdated
  - The EHR cannot be customized without significant investment of resources
  - The hospital does not have the staff/expertise to create a useful electronic tool
  - The ED and inpatient units have different EHR systems that are not interoperable

- Many hospitals reported resources, specifically personnel resources, are limited. Data tracking (especially that required by CMS) requires intensive investment of staff time diminishing the feasibility of taking on additional sepsis care improvement work.

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### C. Opportunities for improvement

Based on a review of the scientific evidence, best practices in sepsis care, and the Betsy Lehman Center’s emergency facility survey, the task force identified many areas of opportunity for improvement, which are reflected in the recommendations below. Most hospitals reported that they have sepsis screening tools to identify adults with sepsis in their emergency departments. However, nine – or 12 percent – indicated that they do not have a screening tool in place, leaving patients with sepsis potentially vulnerable. Similarly, most hospitals have a treatment protocol or algorithm in place to help guide clinicians in their treatment of sepsis in adults. However, many indicated that their facility’s sepsis treatment protocol is codified in an automated order set within the EHR, which can be easily ignored or overridden, demonstrating that implementation of protocols is essential to ensuring that they are followed.

Ongoing staff education and feedback is key to improving early recognition and adherence to clinical protocols. Approximately half of hospitals reported that they offer routine education on sepsis, and many said that education is typically limited to times when process changes are going into place. 47 percent (n=34/71) give regular feedback to ED clinicians on their performance related to accurately diagnosing and treating sepsis. This leaves considerable room for improvement.

Most hospitals indicated that they treat children in their emergency departments, but the vast majority do not have screening or treatment protocols in place for pediatric patients. Cases of pediatric sepsis are comparatively rare, and children present differently than adults, making it important to be able to recognize the unique signs and symptoms of pediatric sepsis.

## RECOMMENDATIONS

The Emergency Department Sepsis Protocols Task Force offers the following recommendations, grouped into six aspects of sepsis care. All of these recommendations are indicated for either the hospital or the ED with the exception of the last set of recommendations related to opportunities for statewide learning and quality improvement.

### ADULT SCREENING AND TREATMENT

Prompt identification and treatment of sepsis is critical to survival.<sup>44</sup> Sepsis is a uniquely challenging condition to diagnose in part because there is no definitive blood test available to rapidly determine whether a patient has sepsis. Instead, clinicians must sort through a constellation of symptoms, including some that mimic other conditions. Utilizing a standardized screening tool in the emergency department is an effective strategy to aid clinicians in the early recognition of sepsis. In addition to adopting a standardized tool and screening procedure, whenever possible, hospitals should incorporate sepsis screening into the facility’s EHR to guide clinical practice.

Evidence-based best practices for treating adults with sepsis and septic shock are continually evolving as new strategies and therapies emerge. However, studies dating back as far as 2001 show that timely use of a standard treatment bundle for patients with severe sepsis and septic shock is effective in reducing mortality.<sup>45</sup> This treatment bundle includes timely administration of antibiotics, volume resuscitation, and infectious source control as well as vasopressors, when indicated.<sup>46</sup> Refer to the Surviving Sepsis Campaign guidelines for the latest guidance on how to treat adult sepsis.

In addition to adopting a standard sepsis treatment protocol for physicians, consider two additional steps: adopt a nurse-initiated protocol to expedite treatment of sepsis and incorporate electronic tools, such as an electronic physician order set, into practice in order to guide appropriate treatment.<sup>47</sup>

Sepsis outcomes in Massachusetts can improve when all hospital emergency departments and satellite emergency facilities:

1. Adopt and implement an evidence-based screening tool that can be used at initial evaluation of adult and pediatric patients in the emergency department.
2. Implement an evidence-based treatment protocol for adult and pediatric patients that includes time-specific treatment goals.
3. Adopt nurse-driven testing protocols to enable nurses to initiate care for patients with suspected sepsis.
4. If possible, work with the hospital's IT department and EHR vendor to incorporate sepsis screening and treatment tools into the EHR.

### PEDIATRIC SCREENING AND TREATMENT

More than 75,000 children are treated for sepsis each year in the United States with mortality rates ranging from 10-20 percent.<sup>48</sup> Infants less than 1 year old are at highest risk of developing sepsis and children with multiple chronic conditions are more likely to have poorer outcomes than healthy children. Pediatric sepsis costs the US health care system an estimated \$4.8 billion each year.<sup>49</sup> Because children with sepsis present differently from adults,<sup>50</sup> and most children go to general hospitals for emergency care rather than pediatric specialty hospitals, every emergency department in Massachusetts that treats children needs a plan to identify and treat pediatric sepsis.

Pediatric sepsis outcomes in Massachusetts can improve when all hospital emergency departments and satellite emergency facilities:

5. Adopt and implement an evidence-based screening tool that can be used at initial evaluation of adult and pediatric patients in the emergency department.

6. Implement an evidence-based treatment protocol for adult and pediatric patients that includes time-specific treatment goals.

### PATIENT MANAGEMENT

Have policies and processes in place that ED personnel can implement to escalate the care of patients with suspected sepsis within the facility, or if necessary, to stabilize and transfer to a higher level of care. Ensure that communication between care teams include information about which elements of the sepsis care bundle the patient has received and at what time. Finally, have a strategy to regularly assess patients with sepsis and those who have been identified as being at risk for developing sepsis.

Sepsis outcomes in Massachusetts can improve when all hospital emergency departments and satellite emergency facilities:

7. Establish a mechanism to prompt escalation of care within the facility, and, when appropriate, to stabilize and transfer to a facility able to provide a higher level of care.
8. Develop a strategy for appropriate hand-offs and communication regarding the care of patients with sepsis.
9. Adopt a strategy for reassessment of patients at regular intervals.

### APPROPRIATE ANTIBIOTIC USE

Timely and appropriate use of antibiotics is an essential element of treating sepsis.<sup>51,52,53</sup> Have in place antibiotic guidelines for the treatment of patients with sepsis, including both broad-spectrum and source-specific antibiotic recommendations.

Given the widely known negative effects of the overuse of antimicrobials, include information on the de-escalation of antibiotics in the guidelines. The Surviving Sepsis Campaign recommends daily reassessment of patients' antimicrobial regimen for possible de-escalation.<sup>54</sup> Implementing an antimicrobial stewardship program is essential to prevent the inappropriate use of antibiotics.

Understanding the public health threats associated with the inappropriate use of antibiotics, hospitals should provide guidance on appropriate antibiotic treatment, including reevaluation or de-escalation of antibiotics:

10. Develop hospital-specific antibiotic guidelines for use in treating patients with sepsis.
11. Establish a mechanism for reevaluating a patient's antibiotic treatment based on culture results and provide guidance regarding reassessment and de-escalation of antibiotic treatment when appropriate.

### STAFF EDUCATION AND FEEDBACK

Education of staff is vital to improving sepsis outcomes because it helps reinforce the reminder to “think sepsis,” and improves familiarity with the treatment bundle and the need to provide care expeditiously. Though education is just one part of a comprehensive approach to sepsis, there is evidence to suggest that education and awareness-raising alone among staff is an effective strategy in lowering sepsis mortality rates.<sup>55</sup> Education may be tailored to suit existing staff education programs and may involve a mix of didactic strategies such as lectures, webinars, and simulations as well as written materials such as posters, pocket cards and flow sheets. However, it is worth noting that a combined strategy of providing education and implementing process improvements at the same time was found to have an even greater impact on improving sepsis outcomes.<sup>56</sup>

Since education helps to support early recognition of sepsis and compliance with treatment protocols, hospitals and satellite emergency facilities should:

12. Educate ED clinical staff on sepsis policies and procedures during the onboarding process and at least annually, and when new practice guidelines are published or existing standards are updated to ensure that care reflects current standards of practice.
13. Develop a mechanism to provide regular feedback to ED clinicians on adherence to sepsis policies and procedures and patient outcomes.

### DATA COLLECTION & QUALITY IMPROVEMENT

Data collection is essential for understanding sepsis outcomes, to assess the impact of changes that are implemented as part of a quality improvement process or to guide further improvement. Data collection opportunities differ from setting to setting, but the following tools offer some potential strategies depending on the type of data the hospital's team can access and the resources available for collection and analysis.

Since data collection and analysis is critical to understanding progress, hospitals and satellite emergency facilities should:

14. Collect, review and analyze data related to the care of patients with sepsis.
15. Assemble a multi-disciplinary sepsis team to review sepsis data, develop improvement strategies and regularly update hospital sepsis policies.

### PATIENT EDUCATION

Survey research shows that patients have a very limited understanding of sepsis.<sup>57</sup> As a result, there's value in educating patients at discharge who may be at risk for developing sepsis. More detailed information for patients who have been diagnosed with sepsis and their caregivers can help them understand what sepsis is, what the expected treatment will be and what supports are needed.

Given that most patients diagnosed with, or at risk for developing sepsis, are unlikely to have all of the information they need about this poorly-understood condition, hospitals and satellite emergency facilities should:

16. Provide materials for patients who are at-risk of developing sepsis and use an evidence-based teaching method to ensure patients have information about the signs of sepsis and clear instructions about when they need to seek medical care.
17. Provide materials for patients and families who have been diagnosed with sepsis and discuss the materials so they understand what the condition is and what to expect.

### Additional actions

In addition to the work that hospital emergency departments must do to improve sepsis outcomes, the task force recommends that the Massachusetts Sepsis Consortium support hospitals in the following ways as they work to implement sepsis quality improvement initiatives:

- Develop structured opportunities for hospitals to share best practices and learn from others about strategies that have improved sepsis outcomes; and
- Develop additional initiatives that help to improve early recognition of sepsis in community settings, including, but not limited to initiatives that engage with emergency medical services, long term care facilities, urgent care centers, to support implementation of process improvements that would allow for earlier detection of sepsis.

### CONCLUSION

Sepsis is a complex and persistent public health challenge that requires the focus and attention of clinicians, health care facilities, health care consumers, researchers and policymakers. Emergency departments serve an important front-line role in ensuring early identification and treatment of sepsis. Implementing the Task Force recommendations will improve sepsis outcomes in Massachusetts. However, improving emergency department care of sepsis patients is only one piece of the larger puzzle. Providers across the continuum of care need to be able to recognize the early signs of sepsis and ensure that patients receive expeditious care. In the months and years ahead, the Massachusetts Sepsis Consortium, with the support of the Massachusetts health care community, will be addressing sepsis challenges in these care settings.

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