Hospital Quality Institute: Sepsis Round Table Attendees, Aug. 29, 2017

Abstract

Sepsis is a serious and deadly health condition impacting millions of lives annually at a cost of $20 billion to the health system[1]. In response, the Hospital Quality Institute (HQI) has actively supported hospitals to implement and improve systems for responding to sepsis since 2012. In August 2017, HQI assembled sepsis leaders from across California for a Sepsis Roundtable to examine recent statewide sepsis performance, share insights derived from hospital efforts, and discuss barriers to continued improvement across the state. This paper shares the discussion points and insights for speeding dissemination and adoption of best practices derived from science, stimulating continued innovation, and supporting hospitals to implement change.

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Introduction:

Sepsis is a serious and deadly health condition impacting millions of lives annually at a cost of $20 billion to the health system[1]. In response, the Hospital Quality Institute (HQI) has actively supported hospitals to implement and improve systems for responding to sepsis since 2012. In August 2017, HQI assembled sepsis leaders from across California for a Sepsis Roundtable to examine recent statewide sepsis performance, share insights derived from hospital efforts, and discuss barriers to continued improvement across the state. The participating hospitals and health systems collectively cared for 47,870 hospitalized sepsis patients during 2016, or 23% of the sepsis population in California. The interest of HQI is hospital-focused, but not hospital-centric. Patients come to hospitals for care but prevention and early identification efforts, key to reducing mortality, are also required upstream of hospitals. This paper shares the discussion points and insights from the HQI Sepsis Roundtable for advancing dissemination and adoption of best practices derived from science, stimulating continued innovation, and supporting hospitals to implement change.

Sepsis in California:

Sepsis is a complex condition affecting those persons whose immune systems are compromised by infection, and often, other comorbid conditions [2]. The downstream inflammatory effects impede tissue oxygenation, leading to multi-organ system failure, or sepsis. While the diagnostic science is evolving, there is no readily available biomarker for sepsis to indicate the moment an immune system is overwhelmed. Clinicians rely on indirect methods for determining when the sepsis condition has evolved through blood tests, vital signs, signs of organ failure, and the absence of other probable causes.

For much of the past decade, the definition of sepsis referred to a spectrum of sepsis conditions: sepsis, severe sepsis, and septic shock. The new international SEP-3 guidelines updated the definition, eliminating the severe sepsis category to recognize that sepsis is already an urgent condition [3]. This clinical complexity is important to understand when measuring the impact of sepsis in the aggregate.

California Sepsis Trends:

Using California OSHPD (Office of Statewide Health Planning & Development) data from coded medical records, HQI evaluated the trend of sepsis incidence and mortality from 2010 to 2016 [Figure 1].

**Sepsis Hospitalization and Case Mortality Rates%**

**California: 2010-2016 (Annual)**

- **Sepsis deaths per 100 sepsis cases (%)**
- **Sepsis cases per 100 hospitalizations (%)**

*Figure 1: Sepsis in California*  
Source: OSHPD Discharge Data
From 2010 through 2015, the mortality rate declined steadily averaging 6% improvement each year while the incidence rate increased 11% on average each year. From 2015 to 2016, both rates slowed by half. Two significant changes occurred during 2015, ICD10 was implemented, introducing a new coding system for documenting care, and the Sepsis Core Measure set was introduced[4]. Reliability of coded data due to variation in application of the sepsis definitions is critical to consider when interpreting potential drivers of these rates. While the incidence rate climbed steadily from 2010 to 2016, the mortality rate decreased indicating gains in identification and treatment. By 2016, sepsis incidence was 6% of all hospitalizations, 83% higher than for 2010, but the mortality rate was only 17%, 32% lower than in 2010.

Figure 2 presents 2016 sepsis cases and mortality by age group. Among the pediatric population, the youngest group (aged one year and below) have the highest mortality at 12%, but a very low case rate. The teen group (15–20 years old) has the lowest mortality rate among all ages. Among adults, both incidence and mortality rates rise with age. The 85+ group has the highest mortality of 22%, several points higher than the 81–84 age group.

During 2016, 86% of sepsis cases developed outside of the hospital were being diagnosed upon hospital admission (Figure 3). Prevention and identification efforts need to be addressed upstream of hospitals in the community and among other healthcare sites sending admissions to hospitals. The Sepsis Alliance, Rory Staunton Foundation, and the Patient Safety Movement Foundation have community education campaigns in place addressing this need.

Figure 2: Sepsis in California Age Bonds
Sepsis Trends Discussion Points:

- Discussion of possible influences on the rates included: the growing awareness and influence of sepsis education for clinicians over the past five years adding to improved early recognition and treatment and leading to increased cases and reduced mortality. Variations in application of the sepsis definitions (i.e. sepsis, septicemia, severe sepsis, septic shock) were also noted among physician practices and hospital systems were also discussed as influences.

- Trend lines are influenced by the evolution of the sepsis definition and coding. Clinicians report variation in sepsis diagnosis coding among practice groups and among individual clinicians due to differences in adoption of new sepsis definitions. Coding changes stem from ICD9 to IDC10 transition, which corresponded to the introduction of the SEP-1 core measure. Discussion of change in the mortality trend line from 2015 to 2017 centered on questions of impact from cleaning up the denominator cases. For example, fewer borderline sepsis cases, which were formerly considered simple sepsis.

- A deep dive into the data was suggested to better evaluate performance. One group stratified 2009–2012 sepsis performance by sepsis DRG which aided evaluation of performance by risk category. DRG 870 mortality was higher than 872, allowing the group to evaluate treatment plans for each level of stratification.

- Healthcare-associated sepsis is a small portion of all sepsis cases, yet hospitals are monitoring and addressing the trend.

California Hospitals’ Response to Sepsis:

The following actions are proposed as best practice sepsis system characteristics for hospital sepsis programs [5]:

- Implementation of standardized sepsis protocol based on Surviving Sepsis Campaign (SSC) recommendations[6–8],

- Formation of a multidisciplinary sepsis team to implement sepsis processes and evaluate outcomes,

- Utilization of sepsis e-Alerts within electronic health record to trigger identification and trigger key process steps,

- Sepsis performance data shared with patients, clinicians, and staff monthly to drive transparency and change,

- Implementation of dedicated sepsis coordinators to drive care and improvements.

- An additional best practice strategy, not specific to sepsis, is the direct partnership and involvement of patient/family voice through structured patient/family advisory committees or councils (PFACs) [9] to ensure all hospital strategies and systems are person-centered.

The HSAG HIIN (Hospital Improvement Innovation Network) is comprised of 275 acute care hospitals from AZ, CA, HI, OH, and TX. The 252 California hospitals form the majority of the HSAG HIIN, which represent 71% of acute short stay hospitals in the state. A poll of hospital leaders was conducted during the Spring 2017 by the HSAG HIIN to determine the extent of best practice implementation for sepsis and other harm topics. Figure 4 displays results for the 243 HSAG HIIN California hospitals that responded (96% California response rate).

Sepsis Hospitalization and Deaths by Admission Presentation: California, 2016

![Graph showing hospitalizations and deaths by admission presentation in California, 2016.]

*Source: OSHPD Discharge Data
**Opportunities:**

**Hospital Sepsis Program Issues and Best Practice Survey Discussion Points:**

- Sepsis and reduce severity of illness leading to death.
- Menstrual many of the recommended strat-egies that drive improvement to prevent sepsis and reduce severity of illness leading to death.

**Best Practice Survey Discussion Points:**

- Technology advances (clinical deci-sion-making aids) support best practice adoption. In one hospital system, sepsis best practice implementation in the emergency department (ED) increased as the technology was enhanced through electronic health record implementation.

- Governance board leader expectations influence the adoption of best practices. Strong governance board leadership drives improvement and is crucial to success for this complex condition touching all aspects of hospital care. Leaders are recommended to adopt, ‘what we measure, we improve and reward.’

- The sepsis treatment protocol is complex and adherence has wide variation so partic-ipants recommend standardizing protocol adoption and resist overreliance on external comparisons. There is interest in collaborating on research in this area to establish and confirm any association between protocol use, early recognition, and mortality.

- Sepsis coordinators help to operation-alize the multiple processes inherent in sepsis care.

- Where PFAC (Patient and Family Advisory Council) members are involved in a sepsis program, they have provided valuable feedback for creating patient-centered education and processes that improve outcomes.

**Figure 4: HSAG HIIN Survey of Sepsis Best Practice Adoption**

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<thead>
<tr>
<th>Best Practice</th>
<th>Percent (#) of Organizations</th>
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<tr>
<td>Standardized Sepsis Protocols</td>
<td>88% (215)</td>
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<tr>
<td>Multidisciplinary Sepsis Team</td>
<td>63% (152)</td>
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<td>Sepsis E-alerts</td>
<td>60% (146)</td>
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<td>Sepsis Data Shared with Staff-Monthly</td>
<td>55% (132)</td>
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<td>Sepsis Coordinator</td>
<td>40% (98)</td>
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<tr>
<td>Patient/Family Advisory Committee</td>
<td>42% (105)</td>
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**Hospital Sepsis Program Issues and Opportunities:**

- Hospital sepsis programs have evolved from critical care and ED-focused to a hospital-wide response. Successful systems have utilized a multidisciplinary approach which have dedicated staff addressing sepsis initiatives, similar to other disease programs.

- Implementation of sepsis protocols, such as reducing antibiotic cycle times, touch multiple processes and technologies: diagnostic laboratory, medication administra-tion, antibiotic selection and administra-tion, ED throughput, handovers, and transitions among others.

- Where challenges with the SEP-1 core measure exist, leaders are encouraged to view the core measure not as a requirement, but instead to understand it as a measure and strategy for sepsis care. If you have a sepsis case, measure progress and celebrate improvements. Consider sepsis SEP-1 as you would other disease measures, such as A1C standard for diabetes. The measure is aspirational, not for comparison.

- Hospitals who have adopted lean meth-odology have greatly reduced process times and standardized discreet workflows for prompt treatment leading to reduced mortality.

- Technology aids screening, diagnosis and treatment. Screening tools imbedded into electronic record, early warning scoring systems and e-alerts trigger staff to evaluate patients for sepsis. New apps to support fluid protocols and tools for assessing perfusion and fluid status are other examples of technology developed to advance sepsis care.

- Use of Rapid Response Teams, Code Sepsis or dedicated sepsis nurses have been adopted by many hospitals to speed treatment.

**Issues & Insights from Measuring Sepsis Performance:**

- There is low reliability of comparison reports due to uneven sampling and uneven application of new definitions.

- Aspects of SEP-1 protocol have higher evidence than others adding to confusion and resistance among clinicians. For example, antibiotic timing has the highest evidence grade, whereas recommended fluid volume studies are less clear.

- Progress and savings happen with improve-ment at the intermediate level and not the most sick (critical care) once the basic steps to address sepsis have been completed.

- The sepsis core measure is reported as all or none to meet compliance rules, but clinical outcomes for sepsis are obtained even when the core measure may not be met completely. In other words, pa-tients improve with early antibiotics and fluids, even if not at protocol standard. Hospital leaders may need support to explain moderate all-or-none perform ance to Board members given all the complexities. Use surrogates such as lower ventilator days, renal days, overall lower hospital mortality to demonstrate progress as sepsis all-or-none improves even incrementally.

- Since benchmarking is so difficult, the bottom line is: be the best you can be, given all the confounding values.

**Addressing Sepsis Settings of Care:**

**Upstream-Sepsis in the Community**

- Public awareness of sepsis has tripled over the past ten years from 19% in 2007 to 58% in 2017 (Sepsis Alliance). Community awareness campaigns are still needed to approach the same public awareness levels as for heart attack and stroke.

- The Rory Staunton Foundation uses patient stories to highlight the need for improvement, focusing on schools and the pediatric population. In addition, using a strategy focused on regulation may induce health system improvements.

- Hospital programs are reaching into at-risk communities for sepsis such as cancer, transplant, and renal populations.

- Antibiotic stewardship and infection pre-vention outreach to all healthcare sites remains a priority and is growing.
Downstream-Preventing Sepsis-related Hospital Readmissions:

Sepsis accounts for a large proportion of 30-day hospital readmissions. Previously hospitalized sepsis patients are at risk for complications such as re-infection, new infections, and impairments of respiratory or other organ systems. Strategies for addressing sepsis readmission include development of outpatient clinics for sepsis patient follow-up, outreach to aftercare organizations to strengthen sepsis competencies, and improved transitions of care. Specific strategies adopted by roundtable participants include:

- Develop relationships with home health and skilled nursing facilities (SNFs) and monitor sepsis readmissions on a monthly basis; review cases to determine and address drivers of readmission.

- Standardize discharge instructions and offer a hospital sepsis resource to home health and SNFs to improve sepsis symptom recognition.

- Encourage primary care physicians to follow sepsis patients for up to 90 days to identify post-sepsis syndrome issues. A healthy sepsis admission has the same rate of readmission as someone with a chronic diagnosis, such as COPD. Sepsis does have impacts on the body that extend beyond hospitalization.

- Use a data-driven approach to address sepsis readmissions case-by-case to identify and address systems issues such as discharge planning, access to discharge antibiotics, medication reconciliation, assistance with daily living activities such as meals and ambulation, access to follow-up services, and family capacity to recognize symptoms of sepsis.

- As for other diagnoses, application of risk stratification scores (i.e. LACE) help to identify folks likely to benefit from palliative care or at risk for readmission.

- Patient navigators have been utilized to guide post-sepsis recovery and care.

Next Steps:

- The hospitals involved in the round table agree to support sepsis information transparency since hospitals do not compete on quality.

- Hospitals should continue to support outreach to upstream and downstream sources of sepsis through targeted programs.

Use of existing HQI programs such as the HSAG HIIN and CHPSO can support hospitals to speed dissemination of strategies and emerging evidence to all California hospitals through strategies such as:

- assembling all HIINs in California to share best practices,
- facilitating a technology hub to share tech insights and distribute common formats for major EHR vendors,
- identifying barriers and mentoring hospitals to incorporate screening tools and other best practices to increase voluntary adoption throughout the state.
- data deep-diving through stratification to evaluate potential for disparities in sepsis performance among population groups.

- supporting a model of sepsis programs after other successful disease programs such as the CMQCC peer mentor physician model or prehospital activation of heart and stroke alerts.

Summary: Sepsis improvement hits every aspect of hospital processes and care. Work on this topic will yield improvements on overall mortality and performance. It will expose many opportunities in your hospital but will also yield incredible benefits as progress emerges. Hospitals that address culture of safety, systems and improve reliability realize much improved sepsis care.
References


