Health-Related Quality of Life Following Pediatric Sepsis

Elizabeth Killien, MD
Pediatric Critical Care Medicine Fellow
Seattle Children’s Hospital
Pacific Northwest Sepsis Conference
March 21, 2017

Outline

- Epidemiology of pediatric sepsis
- Existing literature on pediatric sepsis outcomes
- Study design
- Results

Epidemiology of pediatric sepsis
Sepsis Epidemiology in the United States

- Why is prevalence increasing?
  - Very-low birthweight infants
  - Premature infants
  - Children with underlying comorbidities

Two Central Questions

1. What is happening to these patients who are surviving sepsis?

2. Has mortality become too infrequent to remain a sensitive enough outcome measure?

Existing Literature: Outcomes after Pediatric Sepsis
Existing Literature

- **Readmissions and late mortality after severe sepsis (Czaja 2009)**
  - 47% of children with severe sepsis readmitted at least once
  - 6.5% of survivors died >28 days after discharge

- **Functional status after severe sepsis (Farris 2013)**
  - 34% of children with severe sepsis experienced decline in POPC score 28 days after admission

**Netherlands: Children surviving meningococcal shock**
Quality of life questionnaire at 10-28 months

- 45% exhibited impaired HRQL up to 2 years after discharge
  - Primarily physical functioning
  - 23% required follow-up care

**Senegal: Children with history of bacterial meningitis**
PedsQL scores compared to healthy community controls

<table>
<thead>
<tr>
<th></th>
<th>Case Children</th>
<th>Control Children</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score</td>
<td>82.7 (25.6)</td>
<td>94.4 (14.4)</td>
<td>14.27 (7.72-26.82)</td>
</tr>
<tr>
<td>Physical functioning</td>
<td>80.1 (14.8)</td>
<td>92.1 (10.1)</td>
<td></td>
</tr>
<tr>
<td>Emotional functioning</td>
<td>80.2 (13.6)</td>
<td>92.7 (10.6)</td>
<td></td>
</tr>
<tr>
<td>School functioning</td>
<td>80.7 (28.8)</td>
<td>92.2 (11.9)</td>
<td></td>
</tr>
</tbody>
</table>

Edmond K, Pediatr Infect Dis 2010
**Existing Literature**

Limited understanding of which factors contribute most to adverse outcomes among sepsis survivors

* Pre-morbid conditions *
* Clinical or infectious characteristics *
  • Illness severity *

No data assessing longitudinal HRQL in children following sepsis and comparing it to their baseline status

---

**Study Design**

---

**Overall Objectives**

• Identify how patient characteristics and measures of illness severity are associated with changes in HRQL following pediatric sepsis

• Determine which factors are the most important predictors of subsequent quality of life deterioration and recovery
Study Design

Retrospective cohort study to assess longitudinal HRQL in Seattle Children’s Hospital inpatients with community acquired sepsis

Study Design

Inclusion criteria

• Admission to Seattle Children’s Hospital medical, surgical, or intensive care units from January 1, 2012 through December 31, 2015
• Meet 2005 consensus sepsis criteria during emergency room stay or first four hours of direct admission
• Baseline, admission, and follow-up PedsQL™ data included in Outcomes Assessment Program database
Sepsis Criteria

1. Concern for Infection
   Culture drawn
   • Blood, urine, CSF, tracheal, bronchial, viral PCR, stool, wound, skin
   or
   Antimicrobials given

2. SIRS Criteria

Pediatric SIRS Criteria

At least 2 of the following:
≥ 1 of these criteria

<table>
<thead>
<tr>
<th>Age</th>
<th>Temp</th>
<th>WBC</th>
<th>HR</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1 week</td>
<td>&lt; 36°</td>
<td>&lt; 5</td>
<td>&lt; 100</td>
<td>&gt; 60</td>
</tr>
<tr>
<td>&gt; 1 wk – 1 mo</td>
<td>&lt; 36°</td>
<td>&lt; 5</td>
<td>&lt; 100</td>
<td>&gt; 40</td>
</tr>
<tr>
<td>&gt; 1 mo – 1 yr</td>
<td>≤ 36°</td>
<td>&lt; 5</td>
<td>&lt; 100</td>
<td>&gt; 34</td>
</tr>
<tr>
<td>&gt; 1 yr – 5 yr</td>
<td>≤ 36°</td>
<td>&lt; 5</td>
<td>&lt; 100</td>
<td>&gt; 22</td>
</tr>
<tr>
<td>&gt; 5 yr – 12 yr</td>
<td>≤ 36°</td>
<td>&lt; 4.5</td>
<td>&lt; 100</td>
<td>&gt; 14</td>
</tr>
<tr>
<td>&gt; 12 yr – 17 yr</td>
<td>≤ 36°</td>
<td>&lt; 4.5</td>
<td>&lt; 100</td>
<td>&gt; 14</td>
</tr>
<tr>
<td>≥ 18 yr</td>
<td>≤ 36°</td>
<td>&lt; 4.5</td>
<td>&lt; 90</td>
<td>&gt; 14</td>
</tr>
</tbody>
</table>

Goldstein B. Pediatric Crit Care Med 2005

Pediatric Sepsis Definition

Infection

Sepsis

Severe Sepsis

Septic Shock

SIRS
Study Design

Inclusion criteria

• Admission to Seattle Children’s Hospital medical, surgical, or intensive care units from January 1, 2012 through December 31, 2015
• Meet 2005 consensus sepsis criteria during emergency room stay or first four hours of direct admission
• Baseline, admission, and follow-up PedsQL™ data included in Outcomes Assessment Program database

Outcomes Assessment Program

PedsQL™ Assessments

Baseline
• Recall of month prior to hospitalization

Admission
• Within 72 hours of hospital admission

Follow-up
• 14 – 120 days post-discharge

PedsQL™ as an Outcome Measure

Total Score 0-100
Physical & Psychosocial subscales

Mean score for healthy children: 84.1
Minimally clinically significant difference: 4.5 points

Failure to Recover = Baseline to follow-up score difference ≥ -4.5 points
Variables

- **Demographics**: Age, sex, race/ethnicity, language, insurance, parent age, parent education
- **Comorbidities**: PMCA category, type of chronic illness, immunosuppression, indwelling devices
- **Infection characteristics**: Focus of infection, positive cultures, organism
- **Illness severity**: ICU admission, sepsis categorization, admission PRISM, admission MPEWS, ICU LOS, hospital LOS

Results

Unpublished results to be discussed during presentation
Nearly one-quarter of children surviving sepsis experience a clinically significant decline in HRQL persisting up to 4.5 months following hospital discharge.

Identification of the factors associated with HRQL deterioration is essential to guide interventions to improve long term outcomes.