

## Section 2. Technical Specifications

### Sepsis

#### Measure 5: Timely Fluid Bolus for Children with Severe Sepsis or Septic Shock

##### Description

The proportion of hospitalized children with severe sepsis or septic shock who received a fluid bolus within 60 minutes of meeting diagnostic criteria for severe sepsis or septic shock. A higher proportion indicates better performance.

##### Definitions

<b>Intake period</b>	January 1 through December 31 of the measurement year.
<b>Hospitalized children</b>	All children admitted to the hospital, including the Emergency Department.
<b>Severe sepsis</b>	Sepsis plus one of the following: cardiovascular organ dysfunction OR acute respiratory distress syndrome OR two or more other organ dysfunctions. ICD-9 code 995.92 (See Table 5-B).
<b>Septic shock</b>	Sepsis and cardiovascular organ dysfunction. ICD-9 code 785.52 (See Table 5-B).
<b>Fluid bolus</b>	≥20ml/kg of intravenous or intraosseous fluid administered over ≤15 minutes.

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**Table 5-A: Definition of Severe Sepsis and Septic Shock**

Term	Definition
<b>Severe sepsis</b>	Sepsis plus one of the following: cardiovascular organ dysfunction OR acute respiratory distress syndrome OR two or more other organ dysfunctions.
Sepsis	Systemic Inflammatory Response Syndrome (SIRS) in the presence of, or as a result of, suspected or proven infection
SIRS	The presence of at least two of the following four criteria, <u>one of which must be abnormal temperature or leukocyte count</u> : <ul style="list-style-type: none"> <li>• Core temperature of &gt; 38.5°C or &lt; 36°C.</li> <li>• Tachycardia, defined as a mean heart rate &gt; 2 SD above normal for age in the absence of external stimulus, chronic drugs, or painful stimuli; or otherwise unexplained persistent elevation over a 0.5-to 4-hr time period <b>OR</b> for children &lt;1 yr old: bradycardia, defined as a mean heart rate &lt;10th percentile for age in the absence of external vagal stimulus, β-blocker drugs, or congenital heart disease; or otherwise unexplained persistent depression over a 0.5-hr time period.</li> <li>• Mean respiratory rate &gt; 2 SD above normal for age or mechanical ventilation for an acute process not related to underlying neuromuscular disease or the receipt of general anesthesia.</li> <li>• Leukocyte count elevated or depressed for age (not secondary to chemotherapy-induced leukopenia) or &gt; 10% immature neutrophils.</li> </ul>
Infection	A suspected or proven (by positive culture, tissue stain, or polymerase chain reaction test) infection caused by any pathogen OR a clinical syndrome associated with a high probability of infection. Evidence of infection includes positive findings on clinical exam, imaging, or laboratory tests (e.g., white blood cells in a normally sterile body fluid, perforated viscus, chest radiograph consistent with pneumonia, petechial or purpuric rash, or purpura fulminans).
Suspected infection	Infection is suspected when one of the following is documented: <ul style="list-style-type: none"> <li>• Orders for antibiotics OR</li> <li>• Antibiotics administered OR</li> <li>• Orders for urine, blood or spinal culture OR</li> <li>• Urine, blood or spinal culture drawn OR</li> <li>• Chart notation of:               <ul style="list-style-type: none"> <li>• “Rule out infection” OR</li> <li>• “Suspected infection” OR</li> <li>• “Rule out sepsis” OR</li> <li>• “Suspected sepsis”</li> </ul> </li> </ul>

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Term	Definition
Organ dysfunctions	<p><b>Cardiovascular</b></p> <p>Despite administration of isotonic intravenous fluid bolus <math>\geq 40</math> mL/kg in 1 hour,</p> <ul style="list-style-type: none"> <li>• Decrease in BP (hypotension) <math>&lt; 5</math>th percentile for age or systolic BP <math>&lt; 2</math> SD below normal for age</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• Need for vasoactive drug to maintain BP in normal range (dopamine <math>&gt; 5</math> <math>\mu</math>g/kg/min or dobutamine, epinephrine, or norepinephrine at any dose)</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• <u>Two of the following:</u> <ul style="list-style-type: none"> <li>– Unexplained metabolic acidosis: base deficit <math>&gt; 5.0</math> mEq/L</li> <li>– Increased arterial lactate <math>&gt; 2</math> times upper limit of normal</li> <li>– Oliguria: urine output <math>&lt; 0.5</math> mL/kg/hr</li> <li>– Prolonged capillary refill: <math>&gt; 5</math> seconds</li> <li>– Core to peripheral temperature gap <math>&gt; 3^{\circ}\text{C}</math></li> </ul> </li> </ul> <p><b>Respiratory</b></p> <ul style="list-style-type: none"> <li>• <math>\text{PaO}_2/\text{FIO}_2 &lt; 300</math> in absence of cyanotic heart disease or preexisting lung disease</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• <math>\text{PaCO}_2 &gt; 65</math> torr or 20 mm Hg over baseline <math>\text{PaCO}_2</math></li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• Proven need or <math>&gt; 50\%</math> <math>\text{FIO}_2</math> to maintain saturation <math>\geq 92\%</math></li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• Need for non-elective invasive or noninvasive mechanical ventilation</li> </ul> <p><b>Neurologic</b></p> <ul style="list-style-type: none"> <li>• Glasgow Coma Score <math>\leq 11</math></li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• Acute change in mental status with a decrease in Glasgow Coma Score <math>\geq 3</math> points from abnormal baseline</li> </ul> <p><b>Hematologic</b></p> <ul style="list-style-type: none"> <li>• Platelet count <math>&lt; 80,000/\text{mm}^3</math> or a decline of 50% in platelet count from highest value recorded over the past 3 days (for chronic hematology/oncology patients)</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• International normalized ratio <math>&gt; 2</math></li> </ul> <p><b>Renal</b></p> <ul style="list-style-type: none"> <li>• Serum creatinine <math>\geq 2</math> times upper limit of normal for age or 2-fold increase in baseline creatinine</li> </ul> <p><b>Hepatic</b></p> <ul style="list-style-type: none"> <li>• Total bilirubin <math>\geq 4</math> mg/dL (not applicable for newborn)</li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>• ALT 2 times upper limit of normal for age</li> </ul>
<b>Septic Shock</b>	Sepsis and cardiovascular organ dysfunction

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**Table 5-B: Codes to Identify Severe Sepsis and Septic Shock**

Condition Name	ICD-9 Code(s)
Septicemia	038.xx
Streptococcal septicemia	038.0
Staphylococcal septicemia	038.1
Staphylococcal septicemia, unspecified	038.10
Methicillin susceptible Staphylococcus aureus septicemia	038.11
Methicillin resistant Staphylococcus aureus septicemia	038.12
Other staphylococcal septicemia	038.19
Pneumococcal septicemia [Streptococcus pneumoniae septicemia]	038.2
Septicemia due to anaerobes	038.3
Septicemia due to other gram-negative organisms	038.4
Septicemia due to gram-negative organism, unspecified	038.40
Septicemia due to Haemophilus influenzae [H. influenzae]	038.41
Septicemia due to escherichia coli [E. coli]	038.42
Septicemia due to pseudomonas	038.43
Septicemia due to serratia	038.44
Other septicemia due to gram-negative organisms	038.49
Other specified septicemias	038.8
Unspecified septicemia	038.9
Severe sepsis	995.92
Sepsis	995.91
Septicemia [sepsis] of newborn	771.81
Systemic inflammatory response syndrome due to non-infectious process with acute organ dysfunction	995.94
Bacteremia	790.7
Septic shock	785.52

### Eligible Population

The determination of eligible population for this measure requires medical record data.

<b>Ages</b>	0 to less than 19 years of age during measurement year
<b>Event/Diagnosis</b>	Diagnosed with the severe sepsis or septic shock as documented in the medical record
<b>Transfers</b>	For children with severe sepsis or septic shock who are transferred from another hospital, the proportion who receive a fluid bolus within 60 minutes of arrival.

### Specification

<b>Denominator</b>	All hospitalized children with severe sepsis or septic shock
<b>Numerator</b>	Number of hospitalized children with severe sepsis or septic shock who received a fluid bolus within 60 minutes of meeting diagnostic criteria for severe sepsis or septic shock

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##### ***Exclusions***

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- All children in the NICU.
- Children with chronic renal failure as defined by any mention of chronic renal failure or end stage renal disease.
- Children with congestive heart failure as defined by any mention of congestive heart failure.
- Children who died within 60 minutes of meeting diagnostic criteria for severe sepsis or septic shock.
- Patients with advanced directives for comfort care.
- Patient or surrogate decision maker declined or is unwilling to consent to therapies.