Pediatric Sepsis Initiative

A regions approach

“Shared grief is half the sorrow, but happiness when shared, is doubled.”

Author Unknown
Pediatric Sepsis

Pediatric Sepsis: Northern MI Regional Activity/Power-Plan aka Bundles

Jacques Burgess MD, MPH
Pediatric Sepsis

- Objectives
  - Introduce pediatric sepsis as a global health initiative
  - Discuss the impact of pediatric sepsis
  - Validate the concept of bundles and checklists as beneficial in screening and treating pediatric sepsis
  - Introduce the Northern Michigan regional sepsis initiative
  - Share the regional draft bundle plans
  - Inspire participation
Pediatric Sepsis

- In 2005 World Health Organization (WHO) announced 80% of global child deaths related to five severe infections
  - Pneumonia
  - Malaria
  - Measles
  - Neonatal Sepsis
  - Diarrhea
Pediatric Sepsis

- World Health Organization Estimates Sepsis responsible for 60-80% lost lives per year in childhood.
- First global health initiative in 2007
- Surviving Sepsis Campaign
- Simple measures can reduce deaths!
Pediatric Sepsis

- Initiative began with adult sepsis and embracing the surviving sepsis campaign
  - Recognition that sepsis carried a high burden for morbidity, mortality, and financial expense
  - Sepsis had predictable reproducible events
    - Offered itself to bundles and protocols
    - Logical to share resources and collaborate
Pediatric Sepsis

- WHO Guidelines define sepsis as infection with tachypnea, and tachycardia
- Severe sepsis = sepsis + acidosis or other organ failure
- Septic shock = stage III shock with tachycardia and poor perfusion, stage IV shock with hypotension
- Mortality increases as disease progresses from sepsis to severe sepsis and septic shock
Pediatric Sepsis

Parents of Queens boy who died from undiagnosed infection urges Senate panel: 'No more Rorys'
Rory Staunton's father Ciaran told the Senate Health, Education, Labor and Pensions Committee the heart-wrenching story of how Rory contracted deadly sepsis from an elbow scrape in gym class. The Stauntons asked Congress to form a national education program aimed at early detection
BY DAN FRIEDMAN / NEW YORK DAILY NEWS
TUESDAY, SEPTEMBER 24, 2013, 10:17 PM
Pediatric Sepsis

- The Global Pediatric Sepsis Initiative has now begun

- [http://www.wfpiccs.org/sepsis](http://www.wfpiccs.org/sepsis)
- [http://www.pediatricsepsis.org](http://www.pediatricsepsis.org)
Pediatric Sepsis

- Hospitals in region included
  - Alpena Regional Medical Center
  - Charlevoix Hospital
  - Cheboygan Memorial Hospital
  - Kalkaska
  - McLaren Northern Michigan-Petoskey
  - **Your Name Here**
  - Mercy Hospital Cadillac
  - Mercy Hospital Grayling
  - Munson Traverse City
  - Otsego
  - Paul Oliver Memorial Hospital
  - Reed City Hospital
  - West Shore
Pediatric Sepsis

- The bundle/checklist component of the Surviving Sepsis Campaign for adult severe sepsis has been considered successful in **decreasing sepsis adverse outcomes globally**. The Federation is confident that the **same can be attained for our children**. Please **become ambassadors** for the Pediatric Global Sepsis Initiative and join the initiative by contacting us online or meeting us at the Pediatric Critical Care World Congress in Sydney, Australia, March 13–17, 2011.
# Pediatric Sepsis

## Table 1: Administrative bundle

<table>
<thead>
<tr>
<th>Service</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-flow oxygen/hyperbaric continuous positive airway pressure available to all patients</strong></td>
<td></td>
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<tr>
<td><strong>Ventilator available for all patients</strong></td>
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<tr>
<td><strong>Peripheral and central IV catheters available to all patients</strong></td>
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<tr>
<td><strong>Infusion pumps available</strong></td>
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<tr>
<td><strong>Inotropes available for all patients</strong></td>
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</tr>
<tr>
<td><strong>Intravascular pressure monitoring available for all patients</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Superior vena cava or inferior vena cava/RA pressure/oxygen saturation monitoring available for all patients</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Cardiac output monitoring available for all patients</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Continuous renal replacement therapy available for all patients</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Plasma exchange available for all patients</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Extracorporeal membrane oxygenation available for all patients</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>High-flow oxygen ventilation available for all patients</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Inhaled nitric oxide available for all patients for persistent pulmonary hypertension of the newborn</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Clinical parameter bundle

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capillary refill restored to &lt; 2 s in ED/first hour</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Blood pressure restored to normal in ED/first hour</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Administer IV fluids in ED/first hour for stage III/IV shock</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Administer IV antibiotics/vancomycin if appropriate in ED/first hour</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Administer high flow oxygen in ED/first hour for tachypnea or pneumonitis</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>D5W with sodium administered at maintenance to prevent hyponatremia</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Fluid resuscitation &gt; 20 mL/kg up to 60 mL/kg administered in first hour if appropriate</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Peripheral epinephrine administered in first hour if appropriate</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><em><em>Central epinephrine for cold shock</em>/norepinephrine for warm shock in first hour if appropriate</em>*</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Normal mean arterial pressure-central venous pressure and superior vena cava or inferior vena cava/RA oxygen saturation &gt; 70% targeted in intensive care unit</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Relative adrenal insufficiency treated with steroids</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Atropine used as sedating agent for intubation/ventral line placement</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Ventilator provided for respiratory failure</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Effective tidal volume maintained at 6-8 mL/kg</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Appropriate (sensitive) antibiotic administered in first 2 hrs</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Immunosuppressants hold if using immune suppressive therapy</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Hyperglycemia controlled by insulin</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Intravenous immunoglobulin/clindamycin administered for toxic shock</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>(Group A Streptococcus or Staphylococcus)</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Surgical abscess removed if appropriate</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Cardiac index maintained between 3.3 and 6.9 using American College of Critical Care Medicine guidelines</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Continuous renal replacement therapy used for fluid overload and multigorgan failure before 3 days if appropriate</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Plasma exchange used to treat thrombocytopenia induced multigorgan failure until resolution of thrombocytopenia</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>High-flow oxygen ventilation used if peak inspiratory pressure &gt; 35 cmH2O</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Inhaled nitric oxide used for persistent pulmonary hypertension of the newborn</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Extracorporeal membrane oxygenation used for refractory cardiopulmonary failure</strong></td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*ED, emergency department; IV, intravenous; NA, not applicable; RA, right atrium.*
**Pediatric Sepsis**

<table>
<thead>
<tr>
<th>Clinical Practice Parameter Bundle:</th>
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<tbody>
<tr>
<td>Capillary refill restored to &lt; 2 secs</td>
</tr>
<tr>
<td>BP restored to normal in ED/1st hour</td>
</tr>
<tr>
<td>Administer IV fluids in ED/1st ½ hour for Stage III/IV shock</td>
</tr>
<tr>
<td>Administer IV antibiotics/anti-biotics if appropriate in ED/1st hour</td>
</tr>
<tr>
<td>Oral glycerol for meningitis</td>
</tr>
<tr>
<td>Administer high flow oxygen in ED/1st hour for tachypnea/pneumonia</td>
</tr>
<tr>
<td>D10 with H2 given at maintenance to prevent hypoglycemia</td>
</tr>
<tr>
<td>Fluid resuscitation &gt; 20 mL/kg up to 60 mL/kg given in 1st hour if appropriate</td>
</tr>
<tr>
<td>Peripheral epinephrine given in 1st hour if appropriate</td>
</tr>
<tr>
<td>Central epinephrine for cold shock, norepinephrine for warm shock in 1st hr if appropriate</td>
</tr>
<tr>
<td>Normal MAP - CVP and SVO2 or IVC/RA D2 sat &gt; 70% targeted in ICU</td>
</tr>
<tr>
<td>Absolute adrenal insufficiency treated with steroids</td>
</tr>
<tr>
<td>Ketamine used as sedation agent for intubation/central line placement</td>
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<tr>
<td>Ventilator provided for respiratory failure</td>
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<td>Effective tidal volume maintained at 6-8 mL/kg</td>
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<tr>
<td>Appropriate (sensitive) antibiotic given in first 2 hours</td>
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<tr>
<td>Immune suppressants held if on immune suppressive therapy</td>
</tr>
<tr>
<td>Hyperglycemia controlled by insulin</td>
</tr>
<tr>
<td>IVIG given for toxic shock (Group A Strep or Staph)</td>
</tr>
<tr>
<td>Clindamycin given for toxic shock (Group A Strep or Staph)</td>
</tr>
<tr>
<td>Surgical nidus removed if appropriate</td>
</tr>
<tr>
<td>CI maintained between 3.3-6.0 using ACCM guidelines</td>
</tr>
<tr>
<td>CRRT used for fluid overloads and MOF before 3 days if appropriate</td>
</tr>
<tr>
<td>Plasma exchange used to treat thrombocytopenia induced MOF until resolution of thrombocytopenia</td>
</tr>
<tr>
<td>Lung Protection Strategy</td>
</tr>
<tr>
<td>INO used for PPIN</td>
</tr>
<tr>
<td>ECMO used for refractory cardiopulmonary failure</td>
</tr>
</tbody>
</table>
Pediatric Sepsis

- 2012 Sepsis Guidelines included pediatrics
  - Same sepsis group decided to tackle pediatrics for the region steps include
    - Identify local champions
    - Introduce bundles
    - Staff support for coordinating sites
    - Educational tools
    - Regular conference calls
Why Participate in the SSC?

- Build morale at your hospital
- Use a proven intervention that improves survival of patients with sepsis
- Get ahead of the curve with performance measures
  - NQF
  - NY State
Dr. Nirav Shah, New York State Health Commissioner announced his intention to require reporting of sepsis performance measures state-wide.

Expected to be public reporting.

NY will be first state to do this.
New York State Reporting Requirements

- Hospitals will be required to use an evidence-based protocol for identification and management of patients with sepsis

- Hospitals will be required to report
  - adherence to protocol elements
  - sepsis rates
  - risk-adjusted sepsis mortality
Pediatric Sepsis

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Pediatric Sepsis

- **Thursday, September 19, 2013 11am-1pm** – REMEC Classroom; Dr. Margaret Parker presenting on Pediatric Sepsis via SSC followed by, Sepsis Team debrief

- **Monday, October 7, 2013 7:30a-9:00a** – *Tentative* Regional Conference Call – Pediatric Sepsis meeting – REMEC Classroom

- **Monday, November 4, 2013 7:30a-9:00a** – *Tentative* Regional Conference Call – Pediatric Sepsis meeting – REMEC Classroom

- **Monday, December 2, 2013 7:30a-9:00a** – *Tentative* Regional Conference Call – Pediatric Sepsis meeting – REMEC Classroom

- **Thursday, December 12, 2013 (6:00 PM – 7:30PM)** – One-Hour formal Dinner Lecture w/ 30-min. Q+A (invite hospitals within our region)

- **Friday, December 13, 2013 (9:00 AM – 11:00 AM)** – Informal Q+A meeting with Sepsis Team (include REMEC sites)

- **Friday, December 13, 2013 (12:30 PM – 1:30 PM)** – One-Hour formal Lunch Lecture w/Q+A (plus REMEC sites)

- **Monday, March 17, 2013** – Dr. Keith English Pediatric Infectious Disease specialist here to speak on Sepsis – Details TBD

- **Tuesday, March 18, 2013** - Dr. Keith English Pediatric Infectious Disease specialist here to speak on Sepsis – Details TBD
Pediatric Sepsis

Pediatric Sepsis Order Sets Neonates

Sepsis Screen

Time ZERO and antibiotics in \( \leq 45 \) minutes

Vitals

Core: Manual BP (Consider upper and lower extremity for cardiac concerns), Nude Weight, RR, P, Pulsox (Consider Pre/Post ductal), Cap Refill

Cardiac Monitor, Respiratory Monitor, and Pulsoximetry

Vitals Q15 minutes x 4

Birth Records and Newborn Screen to Bedside Chart

STOP ALERT – [Severe Sepsis?] If yes, initiate transfer process now.

IV Site x 2, I/O set

Labs and XRays

Bedside Glucose, CBC/diff, BC, BMP, LA, Ammonia, pH, Save additional serum PT, PTT, Fibrinogen, D-dimer

CSF – Glucose, TP, Cell Ct. Stain, HSV-PCR, Culture [Must prioritize tests for lab]

Straight Cath

UA – Culture UA NO EXCEPTION and takes priority over analysis if volume is issue.

+/− CXR AP/LAT
Pediatric Sepsis

Consider Metabolic Issue, Adrenal Insufficiency, and Hypoglycemia

**Fluids Crystalloid NS or LR**
- 10cc/kg if cardiac suspected
- 20cc/kg all others

**Medications:**
- Zero-1 month - Cefotaxime or Gentamycin [High Dose], Ampicillin, Acyclovir
- Pressors – Norepinephrine, Dopamine, Dobutamine, Milrinone

**Consider:**
- PRT if needed assistance or resources
- Update transport process
- Consider CVC
- Consider I/O
- Mobile ICU/Flight Team to come get child
Pediatric Sepsis

3-36 months Sepsis Order Set

Sepsis Screen
Establish Time Zero – Goal to administer antibiotics <= 45 minutes

VITALS:

- Manual BP
- Nude Weight, RR, P, Pulsox, Cap Refill, Cardiac and Respiratory Monitor
- Q15 min VS times 4 then Q 30 min times 4
- Two Large IV Sites
- I/O Set-up at bedside

STOP – TIME OUT – Is this severe sepsis, if yes, consider calling transport team NOW. Critically ill children may need mobile ICU.

LABS/X-RAYS:

- Bedside Glucose
- CBC/diff, BC, BMP, LA, pH
- PT, PTT, Fibrinogen, D-Dimer ?????
- CSF – Glucose, TP, Cell Ct, Gram Stain, HSV-PCR, and culture
- STRAIGHT CATH UA – Culture Mandatory
- Consider CXR AP/LAT
Pediatric Sepsis

**FLUIDS:**

Normal Saline or LR 20cc/kg – consider smaller bolus at 10/kg for cardiac kids

**MEDICATIONS:**

- Cefotaxime or Gentamycin (Meningeal/Sepsis doses)
- Consider Gram positive coverage for chronically ill children and those at risk, consider MRSA.
- Consider IV Vancomycin for chronically ill or NICU graduates
- Acyclovir

**PRESSORS:**

- Norepinephrine
- Dopamine
- Dobutamine
- Milrinone

Consider PRT
Update transport process
Consider CVC
Consider I/O
Mobile ICU/Flight team to come get child
Pediatric Sepsis

36 months – 18 years Sepsis Order Set

Sepsis Screen
Establish Time Zero – Goal to administer antibiotics \( \leq 45 \) minutes

**VITALS:**
Manual BP
Weight, RR, P, Pulsox, Cap Refill, Cardiac and Respiratory Monitor
Q15 min VS times 4 then Q 30 min times 4
Two Large IV Sites
I/O Set-up at bedside
Use ports and implanted catheters with caution

STOP – TIME OUT – Is this severe sepsis, if yes consider calling transport team NOW. Critically ill children may need mobile ICU. If greater than 15 years and critically ill, weigh the option of stabilization in MMC ICU vs. transport. Discuss with pediatric hospitalist and intensive care team at MMC

**LABS/X-RAYS:**
Bedside Glucose
CBC/diff, BC x2, BMP, LA, pH
PT, PTT, Fibrinogen, D-Dimer ????
Culture ports and lines.
Pregnancy test for 10 years and greater.
CSF – Glucose, TP, Cell Ct, Gram Stain, HSV-PCR, and culture
STRAIGHT CATH UA – Culture Mandatory
Continent patients may void/consider foley for the older child.
Consider CXR AP/LAT
Pediatric Sepsis

**FLUIDS:**
Normal Saline or LR 20cc/kg – consider smaller bolus at 10/kg for cardiac kids

**MEDICATIONS:**
Cefotaxime or Gentamycin (Meningeal/Sepsis doses)
Consider Gram positive coverage for chronically ill children and those at risk, consider MRSA.
Consider IV Vancomycin for chronically ill.
Acyclovir

**PRESSORS:**
Norepinephrine
Dopamine
Dobutamine
Milrinone

Consider PRT
Update transport process
Consider CVC
Consider I/O
Mobile ICU/Flight team to come get child
Pediatric Sepsis

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  - Introduce pediatric sepsis as a global health initiative
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  - Validate the concept of bundles and checklists as beneficial in screening and treating pediatric sepsis
  - Introduce the Northern Michigan regional sepsis initiative
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Pediatric Sepsis

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    - Identify local champions
    - Introduce bundles
    - Staff support for coordinating sites
    - Educational tools
    - Regular conference calls
Pediatric Sepsis

- We need you
Pediatric Sepsis

- Sepsis Coordinator = Claudia Orth
corth1@mhc.net

- Pediatric Sepsis Physician Champion = Jacques Burgess
jburgess@mhc.net