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In 1992, the American College of Chest Physicians and Society for Critical Care Medicine defined sepsis, severe sepsis and septic shock as a spectrum of disease resulting from a host response to systemic infection.\footnote{Gaieski D.F. et al. Benchmarking the Incidence and Mortality of Severe Sepsis in the United States. \textit{Crit Care Med.} 2013; 41: 1167-1174} SIRS (Systemic Inflammatory Response Syndrome) is an inflammatory response common in bacterial infections, but non-infectious causes may include burns, trauma and hemorrhage.\footnote{Mayr F.B., Yende S. and Angus, D.C. Epidemiology of Severe Sepsis. \textit{Virulence}. 2014; 5: 4-11} Sepsis occurs when a patient with SIRS has a presumed or confirmed infection. Severe Sepsis is defined as sepsis associated with organ dysfunction. Septic Shock is defined as severe sepsis in a patient that despite receiving adequate fluid resuscitation continues to have systolic blood pressure less than 90 mmHg. \footnote{Bone et al. Definitions for Sepsis and Organ Failure and Guidelines for the Use of Innovative Therapies in Sepsis. \textit{Chest}. 1992; 101: 1644-1655}

It has been estimated that severe sepsis affects 750,000 hospitalized Americans a year\footnote{Angus, D.C. et al. Epidemiology of Severe Sepsis in the United States: Analysis of Incidence, Outcome and Associated Costs of Care. \textit{Crit. Care Med.} 2001; 29: 1303-1310}, and as many as one in two patients who die while hospitalized have sepsis.\footnote{Liu, V. et al. Hospital Deaths in Patients with Sepsis From 2 Independent Cohorts. \textit{JAMA}. 2014; 312: 90-92} New York State regulations required hospitals to implement evidence-based protocols for the early recognition and treatment of patients with severe sepsis and septic shock by December 31, 2013.\footnote{}\footnote{}\footnote{} The Department of Health has released a Dictionary of data elements that will need to be reported for all severe sepsis and septic shock-related discharges occurring after April 1, 2014.\footnote{Jamaica Hospital Medical Center has adopted a Sepsis Protocol that calls for the screening, detection and timely treatment of patients with severe sepsis and septic shock. The Sepsis Protocol process focuses on four basic steps: screening, alert, notification, and treatment. When patients meet certain criteria based on documentation of abnormal vital signs, and/or nurses utilize the Sepsis Screening tool, Best Practice Advisories (BPAs) fire that alert both the nurse and the physician. Doctors can then open an order set that will recommend a set of medications and other relevant orders.}

\footnotetext[2]{Mayr F.B., Yende S. and Angus, D.C. Epidemiology of Severe Sepsis. \textit{Virulence}. 2014; 5: 4-11}
\footnotetext[5]{Liu, V. et al. Hospital Deaths in Patients with Sepsis From 2 Independent Cohorts. \textit{JAMA}. 2014; 312: 90-92}
6 http://www.health.ny.gov/regulations/public_health_law/section/405/


9 http://protocol.sepsis.ipro.org/accounts/login
ADULT SEVERE SEPSIS SCREENING, BEST PRACTICE ADVISORIES AND ORDER SETS

During Triage, the nurse records the patient’s vital signs (temperature, heart rate, respiratory rate, blood pressure) and the O2 saturation (SpO2). The nurse also accesses the “Adult Sepsis Screening” tool, and answers “Yes” or “No” to the following criteria:

Suspected Sepsis
Alteration in Mental Status
Immunocompromise (AIDS, Cancer, Organ Transplant)
After documenting the vital signs and answering “Yes” or “No” to each of the questions in the Sepsis Screening Criteria section, the nurse clicks “Next”.

A Best Practice Advisory (BPA) will fire if any of the following conditions are encountered:

1) Any three of the following criteria are met during documentation:
   - Temperature $> 100.4$ or $< 96.5$
   - Heart Rate $> 90$
   - Respiratory Rate $> 20$
   - Systolic Blood Pressure $< 90$
   - O2 Saturation $< 90$

2) Answering “Yes” to “Suspected Sepsis” alone in the Screening Tool.

3) A combination of any three of the following: vital signs or O2 saturation meeting the criteria for severe sepsis evaluation, or “Yes” to any of the criteria in the Screening Tool. For example, a temperature of 101 degrees Fahrenheit, O2 Saturation of 89% and an answer of “Yes” to Alteration in Mental Status “would trigger the BPA.

[Note: If the BPA fires after documenting the vital signs, nurses still need to complete the Adult Sepsis Screening tool.]

The BPA warns the nurse that the patient meets the screening criteria for sepsis, and that he/she needs to alert the ED Attending to evaluate the patient immediately. The patient is then a potential candidate for inclusion in the sepsis protocol.
There is one “Acknowledge Reason” in the nurse’s BPA: “MD to be Notified”. This field is required, indicated by the red stop sign. Nurses need to document the actual time the physician was notified in a note.

In addition to the nurse’s BPA, an In Basket message is sent to Performance Improvement users for purposes of protocol compliance monitoring.

Within the “Pt Care Timeline”, an entry is time-stamped when the screening tool is used. The “Adult Severe Sepsis Screening” event displays the answers selected to the sepsis screening criteria as well as the user associated with accessing the tool.
When a physician opens the patient’s chart, the Best Practice Advisory (BPA) window opens:

**SEVERE SEPSIS ALERT**

See clinical data below:

<table>
<thead>
<tr>
<th>Filed Vitals:</th>
<th>10/01/14 0914</th>
<th>10/01/14 0950</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse:</td>
<td>91</td>
<td>90</td>
</tr>
<tr>
<td>Temp:</td>
<td>102 °F (38.9 °C)</td>
<td>101 °F (38.3 °C)</td>
</tr>
<tr>
<td>Resp:</td>
<td>21</td>
<td>22</td>
</tr>
</tbody>
</table>

Systolic: BP: 88
Suspected Sepsis: Yes (10/01/14 0950)
Alteration in Mental Status: Yes (10/01/14 0950)
Immunocompromise (AIDS, Cancer, Organ Transplant): Yes (10/01/14 0950)

If the patient meets the criteria for severe sepsis please click on Accept to open the Sepsis Order Set.

If the patient does not meet the criteria for severe sepsis, or has a reason not to be treated for sepsis, select a reason for exclusion from the drop down list below.

- Open Order Set: JH ED Sepsis Orderset preview
- The following actions were applied automatically:
- Message sent: This advisory has been sent via In Basket
Filed vital signs and the answers to the “Sepsis Screening Criteria” questions are displayed within the alert. The “Open Order Set” box is checked off by default.

Unchecking the “Open Order Set” box, causes a red stop sign to appear in the “Acknowledge reason” field. This indicates an entry is required if the “JH ED Sepsis Orderset” will not be used. Clicking on the magnifying glass next to the “Acknowledge reason” field allows you to browse through the available choices. The options are based on directives from the Department of Health. Contraindications not listed in the “Acknowledge reasons” can be formally submitted to the Department of Health for approval.
Selecting an “Acknowledge Reason” causes the Open Order Set box to be automatically unchecked.

When a patient meets the screening criteria for sepsis, the physician needs to evaluate and determine if the patient meets the severe sepsis criteria as well as decide if the patient will or will not be included in the protocol. If the patient does not have severe sepsis/septic shock, the following acknowledge reason must be selected: “Patient does not have severe sepsis or septic shock.” If the patient has severe sepsis but has a valid reason not to be treated, any of the other acknowledge reasons (exclusions) should be chosen. Finally, if the patient has severe sepsis and no contraindications to treatment, the “JH ED Sepsis Orderset” should be opened and relevant orders should be placed. Use of the order set marks the initiation of the protocol.

[Note: All cases of severe sepsis/septic shock are reported quarterly to the Department of Health. Currently, 73 data elements are reported per case].
Clicking “Accept” without either checking the “Open Order Set” box or selecting an “Acknowledgment reason” triggers an error message:

“There are active Best Practice Advisories with required acknowledge reasons. Please select a reason and/or choose a follow-up, then click Accept to continue.”
A comment can be added (if desired) within the BPA by clicking on the paper icon next to the magnifying glass.

Opening the order set and placing pertinent orders indicates the patient will be included in the Sepsis protocol and marks the initiation of the protocol. Selecting an Acknowledge reason indicates the patient is either deemed to not have severe sepsis/septic shock or the patient has reasons not to be treated for severe sepsis/septic shock. **The date and time of initiation or exclusion from the protocol is reported to the Department of Health.**
If the Open Order Set box is checked, and you click “Accept”, the “JH ED Sepsis Orderset” displays. From this screen, physicians can order all at once:

1) The lactic acid test (According to our protocol at 0 hour, 3-hour and 6-hour marks)
2) IV fluids for initial resuscitation (Although our protocol indicates to administer 15-20 ml/kg over 15 minutes, the recommendation since its approval has changed to administration of at least 30 ml/kg over 3 hours. This volume recommendation is not a maximum cap; some patients may require more fluids).
3) Blood cultures (Recommendation is to obtain prior to antibiotic administration, but do not delay administration if there is difficulty in obtaining the cultures)
4) Broad spectrum antibiotics (The Jamaica Hospital Sepsis Protocol indicates that broad spectrum antibiotic administration should begin within 1 hour of identification of severe sepsis or septic shock)
5) Vasopressors (if MAP < 65 after adequate fluid loading)
6) Any other relevant tests

Dates and times of administration and/or completion of these elements are reported to the Department of Health. Examples of reportable elements include: the start date and time of antibiotic administration, and the completion date and time of giving at least 30 ml/kg crystalloid if the patient is hypotensive or has a lactate level of greater than or equal to 4 mmol/L.

**We are required to start treatment as soon as possible. For ED patients, the “clock” (also referred to as “start time” or “time zero”) starts at ED arrival, and for the inpatient population as soon as severe sepsis/septic shock is first recognized.**
JH ED Sepsis Orderset (excerpt)
### Empiric Antibacterial Therapy

- **Antibacterials for Suspected Sepsis of Pulmonary Origin-Community Acquired**
- **Antibacterials for Suspected Sepsis of Pulmonary Origin-Health Care Associated**
- **Antibacterials for Suspected Sepsis of Abdominal Origin**
- **Antibacterials for Suspected Sepsis of Skin or Soft Tissue Origin**
- **Antibacterials for Suspected Sepsis of Urinary Tract Origin**
- **Antibacterials for Suspected Sepsis of CNS Origin**
- **Antibacterials for Suspected Sepsis of Unknown Source**
- **Dexamethasone-Sepsis/Meningitis**

### Medications

#### Intravenous Fluids
- **Maintain IV access/Saline Lock**
  
  STAT, ONCE, Starting 9/3/14

- **Sodium chloride 0.9% IV Bolus**
  15 mL/kg, Intravenous, ONCE

- **Sodium chloride 0.9% IV Bolus**
  20 mL/kg, Intravenous, ONCE

- **Dextrose 5% IV Bolus**
  15 mL/kg, Intravenous, ONCE

- **Dextrose 5% IV Bolus**
  20 mL/kg, Intravenous, ONCE

- **Dextrose 5% solution**
  at 100 mL/hr, Intravenous, CONTINUOUS, for 24 hours

- **0.45% NaCl infusion**
  at 100 mL/hr, Intravenous, CONTINUOUS, for 24 hours

- **0.9% NaCl IV infusion**
  at 100 mL/hr, Intravenous, CONTINUOUS, for 24 hours

- **Dextrose 5% and 0.45% NaCl infusion**
  at 100 mL/hr, Intravenous, CONTINUOUS, for 24 hours

- **Dextrose 5% and 0.9% NaCl infusion**
  at 100 mL/hr, Intravenous, CONTINUOUS, for 24 hours

- **Lactated ringers infusion**
  at 100 mL/hr, Intravenous, CONTINUOUS, for 24 hours

#### IV Inotropes/Vasopressors

#### Acid Reducers
- **Alum & mag hydroxide-simeth (ANTACID) 200-200-20mg/5mLml suspension**
  30 mL, Oral, ONCE

- **Calcium Carbonate 648 mg tablet**
  648 mg, Oral, ONCE

- **Ranitidine (ZANTAC) in dextrose 5% 50 mL IV/PB**
  50 mg, Intravenous, ONCE

- **Ranitidine (ZANTAC) tablet**

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*JH ED Sepsis Orderset (continued)*
PEDIATRIC SEVERE SEPSIS SCREENING, BEST PRACTICE ADVISORIES AND ORDER SETS

If the patient is a child, the nurse should use the “Pediatric Severe Sepsis Screening” tool. This tool contains a “Standard Risk” section with specific options for the following criteria: Ill Appearing, Altered Mental Status, Poor Perfusion, Pulses, Tachycardia, Hypotension and Skin. The “Age-Specific Vital Signs and Variables” section displays heart rate corrected for temperature. Enter the patient’s heart rate and temperature in their respective fields. If the patient’s heart rate and temperature do not fall within the defined limits, click on the “x=Exceptions to WDL button”.

If the pediatric patient meets the criteria as a possible candidate for inclusion in the sepsis protocol, the nurse’s BPA will fire, and he/she should alert the physician immediately that the child meets the pediatric sepsis screening criteria. If any three of the following criteria are met or hypotension and one other measure, the nurse’s BPA will fire:
Ill Appearing  
Yes  

Altered Mental Status  
Irritable, Inconsolable, Lethargic, Obtunded  

Poor Perfusion  
Capillary refill > 2 sec or flash or cool extremities  

Pulses  
Decreased, Bounding  

Hypotension  
SBP < 70 plus 2X age < 10 y/o, SBP <90 if > 10 y/o  

Skin  
Cool, Mottled, Flushed, Ruddy  

Temperature  
Fever ≥ 100.4 or hypothermia ≤ 96.8  

Heart Rate Corrected for Temperature that is not within defined limits

<table>
<thead>
<tr>
<th>Temperature</th>
<th>0-1 y/o</th>
<th>2-5 y/o</th>
<th>6-12 y/o</th>
<th>13-18 y/o</th>
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<td>210</td>
<td>170</td>
<td>160</td>
<td>140</td>
</tr>
</tbody>
</table>

The Pediatric Severe Sepsis Screening tool also has a “High Risk for Sepsis” section for patients that are immunocompromised (e.g. chemotherapy, transplant patients, sickle cell disease), have neuromuscular disease or medical/surgical invasive devices (e.g. PICC line, Mediport, Foley Catheter).
Nurse’s Best Practice Advisory

In addition to the nurse’s BPA, In Basket messages are sent to the physician and Performance Improvement users for purposes of compliance monitoring.

When the nurse alerts the doctor, and he/she opens the patient’s chart, a BPA alert displays:

If the patient does not meet the criteria to be included in the protocol, enter an “Acknowledge Reason”, uncheck the “Open Order Set” box, and click “Accept”.

However, if the patient meets the criteria to enter the protocol, then open the “JH Pediatric Sepsis/Septic Shock Admission” order set. From here, the physician can select any required and relevant orders.
If the patient is less than 30 days old, the nurse uses the “Neonatal Severe Sepsis Screening” tool. This tool has a section for “Fever” and for “High Risk Patient”. If a neonate is marked as having a fever greater than or equal to 100.4 in the screening tool, it will cause the nurse’s Sepsis BPA to fire.

**Fever/Hypothermia**

- Fever greater than or equal to 100.4
- Hypothermia less than equal to 96.8
High Risk Patient:

Infant  Less than 30 days old
Immunocompromised  Chemotherapy, Transplant, Steroids/Immunocompromised, Sickle cell disease
Neuromuscular disease  Yes
Invasive Devices  PICC line, Mediport, Foley Catheter, Tracheostomy, CSF Shunt, Gastrostomy

The nurse’s BPA displays if the patient meets the criteria:
When the doctor opens the neonate’s chart, the Best Practice Advisory window opens.

If the patient will be excluded from the protocol, enter an “Acknowledge Reason”, make sure the “Open Order Set” box is unchecked and click “Accept”.

If the patient will be included in the protocol, open the “Neonatal Sepsis” order set, and place any relevant orders.
For the inpatient workflows, selecting “Suspected Infection” or “Acute mental status change” from the custom list of options for “Primary Reason for RRS Activation” will trigger a Sepsis Best Practice Advisory.
In addition to documenting “Suspected Infection” or “Acute Mental Status Change” in the Rapid Response flowsheet, if three out of the following criteria are met, the sepsis BPA will fire:

Temperature > 100.4 or < 96.5
Heart Rate > 90
Respiratory Rate > 20
O2 Saturation < 90%
Systolic Blood Pressure < 90

The nurse should select the Acknowledge reason “MD to be Notified”, click Accept and notify the physician immediately that the patient meets the screening criteria for severe sepsis or septic shock. The time when the physician was notified should be documented in the chart.
In the inpatient workflow, the sepsis BPA will not fire to the physician when opening the patient’s chart. The BPA will appear when he/she navigates to the following activities: Rounding, Manage Orders, Admission, Transfer, and Discharge. The BPA provides several pieces of information:

1) It alerts the doctor to evaluate the patient for severe sepsis/septic shock.

2) It instructs the physician to use the “JH Adult Sepsis Admission” order set if the patient meets the criteria for severe sepsis/septic shock. The order set can be opened from the BPA screen. Opening the order set should be paired with selection of the Acknowledge reason “Patient included in the Sepsis Protocol.”

3) It advises to add “Severe Sepsis” and/or “Septic Shock” to the Problem List if the patient meets the criteria.

4) The BPA displays relevant clinical data filed for the patient.

5) It states to select an appropriate “Acknowledge reason” to indicate if the patient will be included in the sepsis protocol, if the patient does not meet the criteria for severe sepsis/septic shock or if the patient has a reason not to be treated for sepsis.
Note: The “Open Order Set” box is checked off by default when the BPA fires. An Acknowledge reason is always required in the physician’s BPA for the inpatient workflow. However, selecting an acknowledge reason automatically unchecks the “Open Order Set” box. Therefore, if the option “Patient included in the Sepsis Protocol” is chosen, make sure to click on the “Open order set” box, before clicking “Accept”.

** SEVERE SEPSIS/SEPTIC SHOCK ALERT **

This patient has met the screening criteria to be evaluated for SEVERE SEPSIS/SEPTIC SHOCK.

If, upon assessment, the patient meets the criteria for SEVERE SEPSIS, you must:
- Use the sepsis order set below to order a plan of care.
- Add SEVERE SEPSIS/SEPTIC SHOCK to the problem list.

See clinical data below:

- Vital signs:
  - Temp: 101 °F (38.3 °C)
  - SpO2: 98%
- Systolic BP: 89

If the patient does not meet the criteria for severe sepsis, or has a reason not to be treated for sepsis, select a reason for exclusion from the drop down list below.

If the patient meets the criteria, please select “Patient included in the Sepsis Protocol” as a reason from the drop down list and check the Open Order Set box.
Clicking on the magnifying glass next to the Acknowledge reason field displays a list of allowed reasons.
Clicking on the paper icon next to the Acknowledge reason opens up a field where comments can be entered if desired.
Opening and use of the “JH Adult Sepsis Admission” order set marks the initiation of the protocol and allows the physician to place orders for the lactic acid test (at 0 hour, 3 hour and 6 hour marks), IV fluids for initial resuscitation, blood cultures, broad spectrum antibiotics, vasopressors or any other relevant tests all at once. Recommendations for timing of these elements in the inpatient workflow are the same as for the ED workflow.
If the sepsis BPA does not fire for any reason (e.g. patient does not meet the criteria at the time of vitals documentation or screening tool use), but the physician determines the patient should be included in the Sepsis Protocol during evaluation, the sepsis order set should be used.

If you enter “sepsis” in the “Order Sets” search field and click “Add”, the “Record Select” window opens.

From this window, select the appropriate order set, and click “Accept”.

### Record Select

<table>
<thead>
<tr>
<th>Type</th>
<th>Display Name</th>
<th>Record Name</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ED Septic Shock Treatment</td>
<td>ED SEPTIC SHOCK TREATMENT</td>
<td>1600000580</td>
</tr>
<tr>
<td></td>
<td>Neonatal Antibiotics for Specific Bacteria</td>
<td>NEO ANTIBACTERIALS FOR SPECIFIC</td>
<td>3040000523</td>
</tr>
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<td></td>
<td>NeoFax 2008 Dosing of Common Antibiotics</td>
<td>NEO ANTIBACTERIALS NEOFAX</td>
<td>3040000524</td>
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<tr>
<td></td>
<td>JH ED Sepsis OrderSet</td>
<td>JH ED SEPSIS ORDERSET</td>
<td>180000183</td>
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<tr>
<td></td>
<td>JH Pediatric Sepsis/Septic Shock Admission</td>
<td>JH PEDIATRIC SEPSIS/SEPTIC SHOCK ADMISSION</td>
<td>617</td>
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<td></td>
<td>Neonatal Sepsis</td>
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<td></td>
<td>JH Adult Sepsis Admission</td>
<td>JH GEN ADULT SEPSIS ADMISSION</td>
<td>3040000389</td>
</tr>
</tbody>
</table>

7 records total, all records loaded.
For example, if the “JH ED Sepsis Orderset” is selected, and then you click “Accept”, the JH ED Sepsis Orderset is added. Note the check box next to the name.

Right-click on the check box, and select “Add to Favorites”.

Click on “Advanced”.

The “JH ED Sepsis Orderset” displays under your “Favorites”.
There is no limit to the number of order sets that can be added to your Favorites.