CHALLENGES IN IMPLEMENTING SEPSIS CORE MEASURE IN CANCER CARE

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Disclosures

• I have no financial or professional disclosures related to this topic
• There are no discussions that include non-FDA indications for therapeutics
Learning Objectives

• Outline the current and proposed revised CMS core measure sepsis bundle guidelines.
• Describe how the sepsis core measure criteria are problematic for patients with cancer.
• Apply essential best practices in sepsis management to a hypothetical case study.
Sepsis Statistics

• 3rd leading cause of death in world, most common cause nonmalignant death in oncology
• Severe sepsis occurs in 14% oncology patients
• Mortality from severe sepsis and/or septic shock in cancer is 30-40%, higher than other populations
• Early recognition saves lives
• Sepsis can present with atypical signs and symptoms in patients with cancer.
• Early and astute care by bedside clinicians can make the greatest difference in patient outcome

http://www.bing.com/videos/search?q=sepsis+alliance+video&FORM=VIRE2#view=detail&mid=D1B58A028C89F931111CD1B58A028C89F931111C
Definitions

**SIRS**
- Systemic Inflammatory Response Syndrome (SIRS) is two or more of the following: Temp >38.3°C or <36°C, Heart Rate (HR) >90, Respiratory Rate (RR) >20, WBC >12 K/cu mm or <4 K/cu mm or >10% bands

**SEPSIS**
- Two SIRS criteria PLUS a known or suspected bacterial, viral, or fungal infection

**SEVERE SEPSIS**
- Sepsis + at least one sign of end organ dysfunction, such as altered mental status, decreased urinary output, thrombocytopenia, lactate > 2.0, systolic blood pressure (SBP) <90 or mean arterial pressure (MAP) <65, prior to fluid resuscitation

**SEPTIC SHOCK**
- Hypotension and elevated lactate ≥ 4 may be signs of hypoperfusion/ septic shock
- Septic shock is persistent hypotension despite adequate fluid resuscitation (30 mL/kg)

Dellinger et al, 2013
Where does febrile neutropenia fit?

Even though this uses 38.3°C, oncology resources¹,² recommend 38.0°C X 2 within one hour.

**SIRS**
- Temp >38.3°C or <36°C, HR >90, RR >20, WBC >12 or <4 K/cu mm or >10% bands

**SEPSIS**
- SIRS + Infection

**SEVERE SEPSIS**
- Sepsis + End Organ Damage or SBP <90 or MAP <65, prior to fluid resuscitation

**SEPTIC SHOCK**
- Severe Sepsis → Hypotension refractory to fluids

Patients with neutropenia are escalated to at least sepsis.

¹ Baden, Bensinger, Angarone,… Wilson, 2016
² Flowers, Seidenfeld, Bow, Karten, Gleason, Hawley, …Ramsey, 2013
Organ Dysfunction\(^1\) (new onset)

**Signs/ Symptoms**
- Altered mental status
- Low urine output
- Capillary refill $> 3$ seconds
- Mottling
- Weight gain $> 20$ mL/kg - $\sim 2$ kg previous 2 days

**Laboratory Abnormalities**
- Bilirubin $> 2$ mg/dl
- Creatinine $> 2.0$ mg/dl
- Glucose $> 140$ mg/dl absence diabetes
- Hypoxemia requiring BiPAP
- INR $\geq 1.5$
- Lactate $> 2$ mmol
- Platelets $< 100,000$/mm\(^3\)

\(^1\) Dellinger et al, 2013
Surviving Sepsis Campaign

- Initial EBP recommendations 2001 United Kingdom
  - Endorsed by organizations internationally
  - Goal- reduce sepsis mortality 25% in 5 years
- Published sepsis guideline bundles- 2004
- Revised; separation of bundled interventions (2008)
  - Early goal directed therapy [EGDT] (3 and 6 hr interventions)
  - First 24 hrs
- Revised; performance measures, emphasis on continuous screening, establishment of “time zero”- 2012
- Endorsed by 135 organizations, 38 countries

1 Dellinger et al, 2013
**Sepsis Core Measure**

- Began Oct 1, 2015
- Reporting slated Fall 2016, delayed indefinitely
- Mirror Surviving Sepsis recommendations; slight variations
- Impacts all clinical areas across the hospital managing 18 years or older

- Not applicable:
  - Outside transfers
  - End of life/ comfort care
  - LOS > 120 days

- Goal to perform **all** recommended interventions as indicated for patients with severe sepsis or septic shock within defined timeframes
  - Pass or fail based on completeness and timeliness
  - No clear medical exceptions (e.g. fluids and heart failure)
Surviving Sepsis Recommendations¹:  
1st 6 hours

3 hours

- Screen for sepsis at first encounter or defined intervals
- Obtain blood cultures and lactate if positive screen (core measure if severe sepsis)
- Assessment of organ function
- First antimicrobial dose within 60 min of triage (core measure accepts 3 hr)
- Oxygen if O₂ sat < 90%
- Initial fluid bolus at least 30 mL/kg if hypotensive (+/- 10%)

6 hours

- Assessment of infection source
- CVP line- goal 8-12 mm Hg (not in core measure)
- MAP ≥ 65 mm Hg
- Central venous oxygen saturation (ScvO2) ≥ 70 (not in core measure)
- Perfusion assessment by provider before vasopressor therapy that is given if refractory to fluids
- Urine output ≥ 0.5 mL/kg/hr

¹Dellinger et al., 2013
Surviving Sepsis Recommendations\textsuperscript{1}:
1\textsuperscript{st} 24 hours

- Indications:
  - Severe sepsis or septic shock OR
  - Persistent hypotension OR
  - Hyperlactemia (≥ 4.0 mmol/L)
- Low volume ventilation or maintain plateau pressures < 30 mm
- Glucose goal < 180 mg/dl
- Gastric Ulcer prophylaxis
- Venous thromboembolism (VTE) prophylaxis
- Low dose steroids for patients with hypotension\textsuperscript{*}

\textsuperscript{*} Exact methodology/ indications/ length of therapy is variable

\textsuperscript{1}Dellinger et al, 2013
Implementing Sepsis Bundle Interventions: Challenges in Evaluation of Cancer Patients

- Excluded from most studies\(^1\):
  - Congestive Heart Failure (35%)
  - Cancer patients (30%)
- Bundle variability among Quality Measurement Organizations\(^2\)
- Alternative etiology of hyperlactemia\(^3\)
  - Malignancy
  - Dehydration/ hypoperfusion

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\(^1\) Claessens, Aegerter, Boubaker, Guidet, Cariou, & Cub, 2013
\(^2\) Fong, Cercere, Unterborn, Garpstad, Klee, & Devlin, 2007
\(^3\) Casserley, Phillips, Schorr, Dellinger, Townsend, Osborn, ... Levy, 2015
Generalizability of Sepsis Bundle Interventions

- Initial landmark study showed 7% mortality reduction if bundle elements completed 37% of time\(^1\)
  - Unclear which interventions most important
- Mortality reduction with implementation of formalized process 7-15% across all studies
- Patients do not receive same care in all settings
  - “Time zero” recently revised - problematic since many interventions are time sensitive
  - Variables affecting timely antimicrobials - initially a different diagnosis, waiting for cultures to be obtained, younger patients, women, care by non-ED physician\(^2,3\)
  - Prompt sepsis management activation systems not consistently available

\(^1\) Rivers et al, 2001
\(^2\) Cullen, Fogg, Delaney, 2013
\(^3\) Madsen & Napoli, 2014
Key Take Home Message…

Probably not all interventions confer the same value, but research clarifying the most beneficial interventions is still in progress.
## Evidence: How to Implement Sepsis Bundle Interventions

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focused Education</td>
<td>Easy answer</td>
<td>Knowledge retention inconsistent</td>
</tr>
<tr>
<td></td>
<td>Easy to perform</td>
<td>Staff turnover</td>
</tr>
<tr>
<td>Protocols, policies, algorithms</td>
<td>Summarization complex literature</td>
<td>Accessibility when and where needed</td>
</tr>
<tr>
<td></td>
<td>Familiar structure</td>
<td>Complexity</td>
</tr>
<tr>
<td>Structured pre-printed</td>
<td>Guide prescribers to choose correct EBP</td>
<td>Requires recognition of need to activate</td>
</tr>
<tr>
<td>or electronic orders</td>
<td>interventions</td>
<td>May lead to over-treatment</td>
</tr>
<tr>
<td>Unit based Champions/super-users</td>
<td>Solutions within the unit culture</td>
<td>Labor-intensive</td>
</tr>
<tr>
<td></td>
<td>Peer to peer influence</td>
<td>Champions may not always be present/available</td>
</tr>
<tr>
<td>Rapid Response activation with</td>
<td>High activation rates (crying wolf)</td>
<td>Resource intensive</td>
</tr>
<tr>
<td>protocols</td>
<td>Standardization/frequent usage</td>
<td></td>
</tr>
<tr>
<td>Combined interventions</td>
<td>Proven most effective</td>
<td>Resource intensive for integration</td>
</tr>
<tr>
<td></td>
<td>Targets different learning styles/locus of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>motivation</td>
<td></td>
</tr>
</tbody>
</table>
• Multiple methods to reinforce information is better than a single one.
• Multidisciplinary interventions more effective than single profession.
• Electronic forced templated actions without “opt out” options are highly effective to drive interventions.
• Documenting decisions in real-time not the current workflow for most providers.
SCREENING AND ASSESSMENT
Variations In Screening Criteria

Invented Interpretations I have heard

- We decided that neutropenia should be omitted since most patients are neutropenic, therefore two other criteria must be met.
- Many of our patients have baseline heart rates greater than 90/min, so we changed the criteria to “complex tachycardia”.
- Patients are often beta blocked and so heart rate is not a reliable indicator.
- Since so many people meet criteria, we just call the RRT and tell them not to come because we have the situation in hand.
- Subnormal temperatures are common therefore can’t be reliable as a trigger criteria.
Largest Threat to Effective Implementation

Recognizing the septic patient early

BUT...

Oncology may require revised screening processes
OR anticipate many false positive alerts
## Johns Hopkins Baltimore: Revised Sepsis Criteria

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Surviving sepsis</th>
<th>JHH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (T)</td>
<td>T&lt; 36.0C or &gt; 38.3C</td>
<td>T &lt; 35.5C (without symptoms) or &gt;38.0C</td>
</tr>
<tr>
<td>Heart rate (HR)</td>
<td>HR &gt; 90/min</td>
<td>HR &gt; 100/min</td>
</tr>
<tr>
<td>Respiration (RR)</td>
<td>RR &gt; 20/min</td>
<td>RR &gt; 20/min</td>
</tr>
<tr>
<td>Blood pressure (BP)</td>
<td>Systolic BP &lt; 90 mm or &gt; 40 mm drop from baseline, OR MAP &lt; 65 mm</td>
<td>Systolic BP &lt; 90 mm or &gt; 40 mm drop from baseline, OR MAP &lt; 65 mm</td>
</tr>
<tr>
<td>WBC</td>
<td>&lt; 4000/mm3 or &gt; 12,000/mm3, or &gt; 10% bands</td>
<td>&lt; 4000/mm3 or &gt; 12,000/mm3, or &gt; 10% bands, neutropenia</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
<td>Glucose &gt; 140 mg/dl in absence of diabetes</td>
</tr>
</tbody>
</table>

1 Baden et al, 2016  
2 Shelton et al, 2016  
3 Hanzelka et al, 2013  
4 Cooksley et al, 2012  
5 Dellinger, 2012  
6 Singer et al, 2016  

Altered mental status  
Mottling
Differences in Screen Positive Patients

No missed cases true sepsis

Number patients screening positive for sepsis significantly less using Oncology-specific criteria
Two tailed one sample T test, p = <.000

- Core Measure Sepsis screening criteria
  - N = 50
  - T = 5.002

- Modified Oncology Screening criteria
  - N = 55
  - T = 5.172

N = 116 total patients
Blood Lactate as Predictor for Severe Sepsis/ Shock in Oncology

- Options
  - Whole blood lactate
  - Serum lactic acid
- Not universally available
- Rapid results variable
- Alternative reasons high lactate
  - Dehydration
  - Renal impairment
  - Hepatic clearance problems
  - Increased metabolic rate
  - Type B lactic acidosis of malignancy

- Surviving Sepsis 2016\(^1,2\)
  - Lactate + hypotension or vasopressors predict poor outcomes
  - Elevated lactate may precede other signs/symptoms

- Multisite database\(^3\)
- Cancer patients\(^4,5\)
  - High sensitivity, low specificity

\(^1\)Singer et al, 2016
\(^2\)Seymour et al, 2016
\(^3\)Cooksley et al, 2015
\(^4\)Hanzelka et al, 2013
\(^5\)Kece et al, 2016
Common Findings in Sepsis: Mottling
TIME-SENSITIVE INTERVENTIONS
## Johns Hopkins Baltimore

**Hematology-Oncology Clinic**

**Nurse Driven Protocol and Conditional Orders**

### Screen for sepsis

- With vital signs
- With condition changes
- After labs resulted

### Activate conditional orders - blood cultures and lactate

- Alert provider of sepsis screen positive, signs/symptoms severe sepsis or shock
- Accept orders for diagnostic tests or antimicrobials

### Treat cardiorespiratory symptoms

- Initiate fluids for hypotension
- Initiate oxygen for hypoxemia
Timely Completion of All Sepsis Interventions

Obtainment of all sepsis interventions at least 37% of time shown to decrease mortality 7%* 

**Independent samples T-test**

\[ p = 0.00^* \]

*Rivers et al, 2001

**Goal to increase 0-40%**

- **Comparison group**
- **Post-intervention (protocol) group**
Timely Completion of All Sepsis Interventions

Protocol interventions have remained consistent over time.

Goal to increase 0-40%

Baseline 7/12-3/13
Post protocol 4/14-5/14
1 year post-protocol 6/14-4/15
Follow-up Actions

• Nurse activated antibiotic orders
  – Provider identifies which antibiotic to activate with first fever
  – Nurse identifies presence of trigger criteria
  – Nurse calculates creatinine clearance and activates correct order

• Altered “best practice alerts” (BPAs) with new electronic record go-live
  – Based on pilot oncology-specific criteria

• Cancer-center wide sepsis protocol implementation
# Critical Sepsis Intervention Tracking

*For Quality Improvement Purposes Only*

(Not Part Of Medical Record)

<table>
<thead>
<tr>
<th>Date:</th>
<th>Patient Name:</th>
<th>Medical Record #:</th>
</tr>
</thead>
</table>

**Cross-unit communication tool**

What is the patient transfer hand-off report time? ________________

What is the 3 hour goal time? *(Time Zero + 3 hours)*: ________________

<table>
<thead>
<tr>
<th><strong>To be done within 3 hours of Time Zero</strong></th>
<th><strong>To be done within 6 hours of Time Zero</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vitals:</strong> Increase frequency of VS to Q2hrs x 3, unless ordered more frequently</td>
<td><strong>Vitals:</strong> Increase frequency for level of care</td>
</tr>
<tr>
<td>![Vitals Image]</td>
<td>![Vitals Image]</td>
</tr>
<tr>
<td>![Vitals Image]</td>
<td>![Vitals Image]</td>
</tr>
</tbody>
</table>

- **Lactate level collected within 3 hours of start time**
  - Time collected: ________________

- **Cultures obtained before giving antibiotics**

- **Fluid bolus (30 mL/kg) given as ordered if hypotensive or lactate > 2 mmol/L**
  - Within 1 Hour After Infusion:
    - BP#1 Time: ________________
    - BP#2 Time: ________________

- **Antibiotics infused**
  - Abx name: ________________
  - Time hung: ________________

- **Repeat lactate within 5 hours of Time Zero, if first lactate is > 2**

- **If hypotensive after fluid bolus, remind provider to complete Septic Shock Reassessment Note**

- **Vasopressors if persistent hypotension**

**Fluid bolus, BP after infusion, and antibiotic time hung must be documented in patient chart**

Any delays or issues (document here)?

Updated on 01/19/16
Fluid Administration

- Crystalloids recommended in guidelines
- Crystalloids may not be ideal for oncology patients with disease or chemotherapy-related capillary permeability.
  - Traditional resuscitation fluid- 0.9% normal saline
  - Newer recommendations for large volume-lactated ringers
  - Must be “wide open” or timed less than 1 hr
  - Required amount 30 mL/kg actual wgt (+/- 10%)
- Blood is time-consuming to obtain and has risks
- Albumin/plasma is costly
After Fluids and before Vasopressors…

- Two consecutive vital signs assessments within 60 minutes completion of fluid showing hypotension
- Focused physical exam (date/time) includes:
  - Heart & Lungs
  - Skin- temperature, color
  - Capillary refill
  - Peripheral pulses
- Before 3 hours and before start of vasopressors
- Provider may “attest” to review vital signs only
- Alternate to focused exam (any 2)
  - Central venous pressure (CVP)
  - Central venous oxygen saturation
  - Bedside CV ultrasound
  - Passive Leg raise test
ANTIMICROBIALS

• Broad spectrum unless known organism documented
• Start before 3 hours from time zero
• Oral vancomycin acceptable with C-difficile infection
**Evidence: Antimicrobials within One Hour**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Methods</th>
<th>Results</th>
</tr>
</thead>
</table>
| Gaieski, Pines, Band, Mikkelsen, Massone, Furia, Shofer, Goyal, 2010 | Single center, retrospective cohort, 161 pts with severe sepsis and septic shock from 2005-2006 | Median time to antimicrobials was 119 min  
Significant association between antimicrobial administration > 1 hr to increased mortality  
Mortality increased 7.6% for every hour delay in antimicrobial administration |
| Fletcher, Hodgkiss, Zhang, Browning, Hadden, Hoffman, Winick, McCavit, 2013 | Single center, retrospective cohort, 1628 pediatric febrile neutropenia admissions (653 pts) from 2001-2009 | Adverse outcomes 11.1%, 0.7% mortality, 4.7% PICU admission, 10.1% fluid resuscitation  
Time to antibiotics associated with adverse outcomes as composite  
Two times greater risk adverse outcomes > 60 minutes until first antimicrobial |
| Ali, Baqir, Hamid, Khurshid, 2013 | Single center, retrospective cohort, 81 adult and pediatric cancer pts (mostly heme malignancy pts 64%) with FN in ED after PI intervention to improve time to antimicrobial | Mean time to antimicrobials was 45 min  
Nine patients longer than 60 min, and included the only three that developed severe sepsis |
| Ko, Ahn, Lee, Kim, Lim, Lee, 2015 | 1001 FN episodes mostly solid tumor pts (80%) from 2011-2014 | Mean time to antimicrobials was140 min  
Time to antimicrobial did NOT influence incidence of severe sepsis, septic shock or mortality |
| Mokart, Saillard, Sannini, Chow-Chine, Brun, Faucher, Blache, Blaise, Leone, 2014 | Single center, retrospective cohort, 118 pts admitted to ICU with severe sepsis or septic shock from 2008-2010 | Multivariate analysis showed most important predictor for mortality was time to antibiotic greater than 1 hr |
Antimicrobials

Every hour delay beyond the first 60 minutes, increases mortality about 7.6%
Sample Fever Orders

- Cross-over communication between inpatient and outpatient
- Increase cultures before antibiotics
- Pre-approved antibiotics for more rapid administration
- Template nursing assessment and vital signs
Challenging Value of Selected Interventions

(ProCESS Investigators, 2014)

- Randomized controlled trial
- Compared three arms management of severe sepsis/septic shock
  - bundled Early Goal-Directed Therapy
  - protocol-based care without central venous catheter, ScvO2, inotropes or transfusions
  - usual care in a practice setting trained in bundle interventions
- Setting: 1341 patients, 31 Emergency departments
- Outcome measurement: 90 day mortality, 1 year mortality, need for organ support
- Results: No mortality differences at 90 days/1 year, no differences in organ support
Central Venous Pressures (CVP)

Unclear if CVP measurements or CVP guided therapy enhances outcomes
Corticosteroids in Sepsis
Volbeda, Wetterslev, Gluud, Zijlstra, van der Horst & Keus, 2015, Int Care Med, 41, 1220-1234

- Cochrane methodology
- Randomized clinical trials evaluating corticosteroids for sepsis in adults
- 35 trials; 4682 patients
- Outcomes:
  - Mortality
  - Serious adverse effects (SAE)
- All trials except two had high risk of bias

Findings:
- No statistically significant effect of any dose steroids versus placebo on mortality or SAE
- Low risk bias trials confirmed findings
- No difference in steroid dose on outcomes
- No difference in days of treatment on outcomes
Corticosteroids

No established best practice for steroid use in sepsis despite recommendations from Surviving Resuscitation
## Implementation in Resource-limited settings

<table>
<thead>
<tr>
<th>Concern</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening criteria sensitive, many false positives</td>
<td>New recommended qSOFA criteria are simpler with better predictability for poor outcomes(^1,^2)</td>
</tr>
<tr>
<td></td>
<td>qSOFA = ≥2- altered mental status, SBP &lt; 100 mm, RR &gt; 20</td>
</tr>
<tr>
<td>Time sensitivity of recommendations</td>
<td>Studies show benefit even with less than optimal implementation(^3,^4,^5)</td>
</tr>
<tr>
<td>Availability of lactate measurement</td>
<td>Hypotension paired with other clinical signs of hypoperfusion (urine out, mottling) may be equally predictive(^6,^7)</td>
</tr>
<tr>
<td>Perfusion evaluation requiring technology</td>
<td>Latest recommendations no longer suggest central venous catheter or central venous oxygen saturation. Physical evaluation of perfusion acceptable(^7,^8)</td>
</tr>
</tbody>
</table>

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\(^1\) Seymour et al, 2015  
\(^2\) Dellinger et al, 2012  
\(^3\) Mahavanakul et al, 2012  
\(^4\) Kuan et al, 2012  
\(^5\) Wang et al, 2012  
\(^6\) Casserly et al, 2015  
\(^7\) Singer et al, 2016  
\(^8\) The ProCess Investigators, 2014
Sepsis Interventions CAN be implemented in resource-limited settings

- Escalate screening for highest risk
- Broaden screen positive triggers
- Protocolize care for efficiency
- Any effort to standardize has reduced mortality in all settings
- Use biomarkers if available
- Don’t expect perfection
The MD Anderson Experience

• Purpose: Compare baseline and post-protocol (orders, algorithm) for Early Goal-Directed Therapy sepsis management
• Setting: Emergency setting, single center, NCI Designated comprehensive Cancer Center
• Methods:
  – Sample (n= 355): 100 pts severe sepsis or septic shock prior to intervention, and at least 100 randomly selected severe sepsis or septic shock post intervention
  – Modified screening criteria:
    • Fever and/or hypotension plus another SIRS
    • Neutropenia NOT included
    • Heart rate modified to 100/min
  – No measurement of central venous pressure related interventions

• Outcome measures:
  – 28 day mortality
  – ICU length of stay (LOS) / hospital LOS
  – Goal mean arterial pressure and urine output at 6 hours
  – Time to lactic acid measure
  – Appropriateness and timeliness of antimicrobials

• Significant Results:
  – Mortality significantly reduced (20% vs 38%)
  – Patients reaching goal BP (74% vs 90%)
  – Patients reaching goal urine output (79% vs 96%)
Definition of severe sepsis (SIRS + any one):
- Lactate > 2.0 mmol
- Hypotension
- New onset organ failure
- Altered mental status

Baseline and post-protocol group comparisons:
- Similar demographic variables
- Similar incidence of confirmed infection and culture positivity
- Lactate obtained for 1/38 baseline patients, 33/40 1 yr post-protocol
- Criteria meeting severe sepsis different between groups
- Post-protocol group met severe sepsis $P = 0.07$
Comparison of Groups
(Excluding lactate)

Severe sepsis without lactate

Baseline: 44.7%
1 Yr post protocol: 12.8%
P = 0.04

Severe sepsis with hypotension

Baseline: 34%
1 Yr post protocol: 12.5%
P = 0.023
Sepsis Management Algorithm

- Screen
- Evaluate
- Identify
- Source
- Perfuse
- Ensure organ perfusion
- Diagnostic tests
- Seek source and manage

The Sidney Kimmel Comprehensive Cancer Center
Clock Start Times

**Severe Sepsis (if both, earliest time used)**
- Prescriber documents “severe sepsis”,
  **OR**
  - Prescriber documents suspected new infection (removed from core measure if provider note redefines to non-sepsis diagnosis)
  - ≥ 2 SIRS
  - New onset organ dysfunction (list of clinical and lab criteria)
  - Lactate > 2.0 mmmol

**Septic Shock**
- Hypotension (SBP <90, SBP decreased by > 40 mmHg prior recorded SBP, or MAP < 65)
  **OR**
  - Lactate > 4
### Sepsis Core Measure Requirements
**(Interventions and Documentation)**

#### Severe Sepsis

(Time Zero = ↓ BP, new organ failure or lactate > 2.0)

- **Lactate**
- **BCx**
- **Antibiotic(s)**

<table>
<thead>
<tr>
<th>Hours</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bolus</strong></td>
<td>30 ml/kg crystalloid fluid if ↓ BP or lactate &gt; 2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- Repeat lactate if > 2.0 and after fluid bolus—consider more fluid

#### Septic Shock

(Time Zero = ↓ BP despite fluids or lactate > 4.0)

- **Lactate**
- **BCx**
- **Antibiotic(s)**

<table>
<thead>
<tr>
<th>Hours</th>
<th>0</th>
<th>1</th>
<th>2</th>
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</tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

- Two BP measurements**
- Vasopressors if MAP < 65
- Document response***

*Bolus is 30 mL/kg in less than 1 hr

** After fluid bolus for ↓ BP, check two BP measurements within one hour of completion

*** Document peripheral pulses, skin color and warmth

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*Johns Hopkins Nursing*  
*The Sidney Kimmel Comprehensive Cancer Center*
Case Study Application

- Mr C, 68 year old male, pancreatic cancer, treatment cycle 2/17 days ago - gemcitabine, abraxane.
- Biliary stent revision yesterday, sent home
- Return to oncology clinic nurse with chills, aches, malaise, no fever
- VS: T-35.4, HR-118 (irreg), R-22, BP-92/50, O2 sat 90% room air
- Provider orders- CBC/chem/blood and urine cultures, chest x-ray
- Key lab results- WBC 12.8, Platelets 79,000, BUN 30, Creat 1.8
- X-ray- lobular infiltrates, pneumonia
- Registration time- 1000
- First encounter (vital signs) time- 1015
- Diagnostic orders- 1040
- Lab draw done- 1050
- Completed X-ray- 1110
- Resulted labs- 1130
- Resulted x-ray- 1200
- Does this patient have: sepsis, severe sepsis, septic shock
- What is time zero? 1000, 1015, 1040, 1130, 1200
Discussion

• Sepsis core measure has a clinical impact upon workload.
  – Organizations should consider resources needed to implement the core measure in specific populations and adjust workflow.

• Hospital-wide efforts to detect and intervene in sepsis should be tailored to the population
  – Cancer-specific sepsis triggers missed with universal screening criteria.
  – Oncology-specific criteria require more robust evaluation.
  – Pilot data suggest that modified screening criteria reduces workload without sacrificing sensitivity of screening.

• Accurate and streamlined early screening for sepsis permits more time for recommended three-hour interventions.
Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)


• Process
  – Task force of experts
  – Meetings
  – Delphi processes
  – Analysis of records
  – 31 organization endorsement

• Screening change
  – SOFA score increase 2 points in ICU
  – Quick SOFA (qSOFA) in non-ICU (any two)
    • RR > 22/min
    • Altered mentation
    • SBP < 100 mm Hg

• Sepsis and septic shock
  – Sepsis: life-threatening organ dysfunction
  – Septic shock: subset of sepsis patients requiring vasopressors to maintain a MAP > 65 mm Hg OR serum lactate > 2.0mmol/L in absence of hypovolemia
Revised CMS Core Measure 2017

- **Identification**
  - Removed if provider documents sepsis R/O

- **Diagnostic tests**
  - Unable to obtain
  - Refusal

- **Antimicrobials**
  - Targeted antimicrobials with known organism

- **Fluids**
  - Estimated weight
  - Within 10% expected

- **Reperfusion assessment**
  - Provider can attest to others’ assessment VS
Questions?

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References


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