Early Recognition of Sepsis in the Outpatient Setting: The Role of Practitioner, Patient and Family in the Earliest Phase of Sepsis

AQIN Community Based Sepsis Initiative
June 16, 2016
CMS Special Innovation Project: Community Based Sepsis Initiative

Two Year Contract Award
- September 2015- September 2017

Performance Based Measures (Medicare FFS pts.)
AQIN Based (Atlantic Quality Innovation Network)
- New York (IPRO)
- South Carolina (The Carolinas Center for Medical Excellence)

Sepsis: Number one driver of 30-day readmissions in New York State

Community Awareness is Low: Highest sepsis mortality rates occur in first 4 days of a hospital stay
Target Region

Albany & Syracuse Hospital Referral Regions (HRRs)

- **Albany HRR**
  - In-hospital sepsis mortality rate of 14.6%
  - Ranks 8th in NYS HRRs for sepsis admissions

- **Syracuse HRR**
  - In-hospital mortality rate of 15.6%
  - Ranks 7th in NYS HRRs for sepsis admissions

- **National**
  - In-hospital All Cause Mortality Rate
  - 4.2%

Source: CMS Medicare Paid Claims Data
Community Bases Sepsis Initiative

Approach

- Facilitate education and build awareness of sepsis among pre-hospital providers and caregivers (community Medicare beneficiaries). Train-the-Trainer format
- Identify best practices and educate pre-hospital providers on prompt recognition of early signs and symptoms of sepsis
- Educate on the premise that Sepsis is a medical emergency
- Improve processes of care transitions and sepsis treatment between pre-hospital and emergency/hospital care settings as well as post-acute discharge into the community
- Increase public awareness of the signs, symptoms and risk factors for sepsis through community outreach, public service announcements and social media
IPRO Sepsis Training

- Skilled nursing facilities: clinical and non-clinical staff
- Home Health Agencies: clinical and non-clinical staff
- Physician Office Staff: non-clinical staff
- 13 Regional Train-The-Trainer sessions have been held to date. Four more sessions scheduled in June
- As of June 7th, 1,043 pre-hospital providers and caregivers have been trained on Sepsis Awareness utilizing IPRO training tools
Early Recognition of Sepsis: An Opportunity in the Outpatient Setting

The Role of Practitioner, Patient and Family in the Earliest Phase of Sepsis

Alan Sanders, M.D.
Early Recognition of Sepsis
Lecture Outline

• Review of Definitions: 2016 Update
• Patient Groups at Increased Risk
• Common Diseases Presenting in the Outpatient Settings with Sepsis Potential
Sequential Features of Sepsis

- A fairly predictable series of symptomatic, objective and laboratory events occurs from the earliest phase of infections that progress to sepsis and septic shock.

- This progression does not always manifest in the same timeline/aggressive format, with differences by site of infection, pathogen and host.
SIRS – The Potential for Sepsis

- The Systemic Inflammatory Response Syndrome (SIRS) is a constellation of physical exam and laboratory features that project a dysregulation of inflammation, and may be due to an inflammatory OR infectious insult.

- **SIRS CRITERIA WHEN 2 OR MORE OF THE FOLLOWING MET**
  - TEMPERATURE > 38.3c or < 36c
  - HEART RATE > 90
  - RESP RATE > 20/ min
  - WBC > 12,000 or < 4,000 or > 10% band forms
SIRS to Sepsis, Septic Shock

• When SIRS criteria are met, a source for infection should always be sought/investigated, including in an out-patient setting.

• With > 2 SIRS criteria, in the presence of a probable or documented infection the picture is now ....SEPSIS.

• With the additional features of hypotension, decreased urine output, altered mental status or cool/mottled extremities the patient has progressed to.... SEVERE SEPSIS.

• After adequate fluid resuscitation, persistent hypotension that requires pressors ... SEPTIC SHOCK
Consensus on Sepsis: Evolution for Predictors and Definitions for Sepsis and Septic Shock

- Multiple professional societies that care for the critically ill have produced consensus statements regarding the identification, treatment and predictors of outcome for the continuum of sepsis.
- Published in 1992, 2003 with additional treatment guidelines in 2008, 2012 these multi-society panels have once more revisited and redefined both Sepsis and Septic Shock and the clinical predictors that lead to both scenarios.
Third International Consensus Definitions for Sepsis and Septic Shock
Singer, et al. JAMA 2016;315(8) 801-810

• “Public awareness of sepsis is poor”
• “Various manifestations of sepsis make diagnosis difficult”
• “The public needs an understandable definition of sepsis”
• “Health care practitioners require improved clinical prompts and diagnostic approaches to facilitate earlier identification and accurate quantification of the burden of sepsis”
New Consensus Definitions for Sepsis: What’s In and What’s Out

JAMA 2016; 315(8): 801-10

- **SIRS** a measure of inflammatory response to both infectious and non-infectious conditions, and a possible predictor of sepsis is... **OUT.**

- **SIRS** felt to be present in too many hospitalized patients who never develop infection or incur adverse outcomes. And, 12% of ICU pts. in one study with true, progressive sepsis did not meet the requisite 2 SIRS criteria for sepsis (poor validity)
New Consensus Definitions for Sepsis: What’s In and What’s Out

JAMA 2016; 315(8): 801-10

• **SOFA** Sequential Organ Failure Assessment Score. A morbidity severity/mortality predictor score for ICU patients based on summary calculations of:
  - Respiratory function (PaO2/FiO2)
  - Coagulation (Plats)
  - Liver function (bilirubin)
  - Hemodynamics (MAP)
  - CNS (Glasgow Coma Scale)
  - Renal Function (Creat/ Urine output)
Quick SOFA (qSOFA) - a novel, robust tool measuring only three (3) clinical (non-lab) variables predictive of outcomes in out-of-hospital, and non-ICU settings (ED/Wards).

- Altered Mental Status (GCS <13)
- Hypotension (Systolic < 100mmHg)
- Tachypnea (RR> 22)

An Easy to Use Tool outside the hospital!

Any 2 of 3 above provides simple bedside criteria to identify adults with suspected infection who are likely to have poor outcomes.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Systemic Inflammatory Response Syndrome (SIRS) Criteria (Range, 0-4 Criteria)</th>
<th>Sequential Organ Failure Assessment (SOFA) (Range, 0-24 Points)</th>
<th>Logistic Organ Dysfunction System (LODS) (Range, 0-22 Points)</th>
<th>Quick Sequential Organ Failure Assessment (qSOFA) (Range, 0-3 Points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory rate, breaths per minute</td>
<td></td>
<td>$P_{aO_2}/F_iO_2$ ratio</td>
<td>$P_{aO_2}/F_iO_2$ ratio</td>
<td>Respiratory rate, breaths per minute</td>
</tr>
<tr>
<td>White blood cell count, $10^9/L$</td>
<td></td>
<td>Glasgow Coma Scale score</td>
<td>Glasgow Coma Scale score</td>
<td>Glasgow Coma Scale score</td>
</tr>
<tr>
<td>Bands, %</td>
<td></td>
<td>Mean arterial pressure, mm Hg</td>
<td>Systolic blood pressure, mm Hg</td>
<td>Systolic blood pressure, mm Hg</td>
</tr>
<tr>
<td>Heart rate, beats per minute</td>
<td></td>
<td>Administration of vasopressors with type/dose/rate of infusion</td>
<td>Heart rate, beats per minute</td>
<td></td>
</tr>
<tr>
<td>Temperature, °C</td>
<td></td>
<td>Serum creatinine, mg/dL, or urine output, mL/d</td>
<td>Serum creatinine, mg/dL</td>
<td></td>
</tr>
<tr>
<td>Arterial carbon dioxide tension, mm Hg</td>
<td></td>
<td>Bilirubin, mg/dL</td>
<td>Bilirubin, mg/dL</td>
<td></td>
</tr>
<tr>
<td>Platelet count, $10^9/L$</td>
<td></td>
<td>Platelet count, $10^9/L$</td>
<td>White blood cell count, $10^9/L$</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Urine output, L/d</td>
<td>Serum urea, mmol/L</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prothrombin time, % of standard</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: $F_iO_2$, fraction of inspired oxygen.

* Measurement units for LODS variables per original description by Le Gall et al.
New Consensus Definitions for Sepsis:  
What’s In and What’s Out

JAMA 2016; 315(8): 801-10

• **SEPSIS** life-threatening **organ dysfunction** caused by dysregulated host response to **infection**.

• Organ Dysfunction is determined by SOFA scoring, with an increase of 2 points or more from baseline

• **SEPTIC SHOCK** – sepsis along with:
  • fluid-unresponsive hypotension.
  • need for pressors to keep MAP >65 mmhg.
  • Serum lactate greater than 2 mmol/L

• **SEVERE SEPSIS** – a definition no longer to be used
Distribution of Patient Encounters Over SIRS Criteria and SOFA, LODS, and qSOFA Scores Among ICU Patients and Non-ICU Patients With Suspected Infection in the UPMC Validation Cohort (N = 74,454)ICU indicates intensive care unit; LODS, Logistic Organ Dysfunction System; qSOFA, quick Sequential [Sepsis-related] Organ Function Assessment; SIRS, systemic inflammatory response syndrome; SOFA, Sequential [Sepsis-related] Organ Function Assessment. The x-axis is the score range, with LODS truncated at 14 points (of 22 points) and SOFA truncated at 16 points (of 24 points) for illustration.
Common Infectious Syndromes: Risk for Sepsis Progression

• Skin/Soft Tissue Infections – *Strep/Staph*
• Pneumonia – *S. pneumoniae, Legionella*
• Endometritis (post-partum) – *Strep/polymicrobial*
• Urinary Tract – device exchange, obstructive stone disease, post TRUS-P
• Enteritis – *C.difficle*, Invasive colitis
• TBI – Babesia and Anaplasmosis
Host Factors that Require Added Attention for Progression to Sepsis

- Immunosuppressed/ A.I.D.S.
- Asplenic
- Malignancy
- Elderly
- Alcoholics/Cirrhotics
- Neutropenic Host
Recognition of Sepsis in the Outpatient Setting

- Along with qSOFA (AMS, hypotension, tachypnea) criteria being met, an appropriate search for any source of infection is needed.
- Cultures of blood and, if indicated, urine, sputum, or wounds, especially if associated with purulence and/or cellulitis.
- Recognize that diagnostic errors/misses are a major factor in potential progressive infection and medical malpractice claims/awards.
### Table 2. Types and Outcomes of Events by Setting, 2009a

<table>
<thead>
<tr>
<th>Event typeb</th>
<th>Inpatient (n=4910)</th>
<th>Outpatient (n=4448)</th>
<th>Both Settings (n=966)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical</td>
<td>34.1 (32.8-35.4)</td>
<td>14.4 (13.4-15.4)</td>
<td>32.3 (29.3-35.3)</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>21.1 (20.0-22.3)</td>
<td>45.9 (44.4-47.4)</td>
<td>26.7 (23.9-29.5)</td>
</tr>
<tr>
<td>Treatment/medication</td>
<td>20.3 (19.2-21.5)</td>
<td>29.5 (28.2-30.9)</td>
<td>23.6 (20.9-26.3)</td>
</tr>
<tr>
<td>Obstetric</td>
<td>12.5 (11.6-13.5)</td>
<td>1.7 (1.3-2.0)</td>
<td>8.1 (6.4-9.8)</td>
</tr>
<tr>
<td>Other</td>
<td>7.6 (6.9-8.4)</td>
<td>6.7 (6.9-7.4)</td>
<td>8.7 (6.9-10.5)</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>4.2 (3.6-4.8)</td>
<td>1.8 (1.4-2.2)</td>
<td>0.6 (0.1-1.1)</td>
</tr>
<tr>
<td>Outcomec</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td>36.1 (34.8-37.5)</td>
<td>30.6 (29.3-32.0)</td>
<td>30.4 (27.5-33.3)</td>
</tr>
<tr>
<td>Quadriplegia/brain damage/lifelong care</td>
<td>7.4 (6.6-8.1)</td>
<td>3.4 (2.9-3.9)</td>
<td>4.2 (2.9-5.4)</td>
</tr>
<tr>
<td>Major injury</td>
<td>37.8 (36.5-39.2)</td>
<td>36.1 (34.6-37.5)</td>
<td>41.9 (38.8-45.1)</td>
</tr>
<tr>
<td>Minor injury</td>
<td>17.6 (16.6-18.7)</td>
<td>27.8 (26.5-29.1)</td>
<td>22.0 (19.3-245.8)</td>
</tr>
<tr>
<td>Emotional injury only</td>
<td>1.0 (0.7-1.3)</td>
<td>2.1 (1.7-2.6)</td>
<td>1.6 (0.8-2.3)</td>
</tr>
</tbody>
</table>

a Three comparisons were tested: inpatient vs outpatient, inpatient vs both, and outpatient vs both.
bP < .001 for all comparisons.
cP < .001 for inpatient vs outpatient and inpatient vs both. P = .001 for outpatient vs both.
Patient Education and Engagement: Recognition of Sepsis

• It is incumbent upon medical providers to educate patients, families and caregivers regarding the important features to be aware of in cases of possible infections that MAY proceed to sepsis upon leaving the office.

• With SIRS (or qSOFA) criteria being met, and a potential site of infection considered, a host of signs and symptoms must be reviewed if the decision is made not to admit the patient to an acute care setting.
Signs and Symptoms of Impending Sepsis, and Severe Sepsis: What the Patient and Family Need to Know

• Decrease, or darkening (concentrating) of urine output.
• Increase in finger stick blood glucose in diabetics.
• Ongoing fevers, chills, rigors despite treatment.
• Cool extremities or mottling of skin.
• Altered mental status (recognized by others)
SKIN AND SOFT TISSUE INFECTIONS

RECOGNIZING RISKS FOR SEPSIS
Skin/Soft Tissue Infections: Risk of Progression to Sepsis/Shock

• Predominant pathogens for rapid progression to overwhelming infection – Group A and B Streptococcus
• Staphylococcus aureus, notably CA-MRSA, play an increasing role in out-patient presentations that could lead to septicemia.
• Prompt I+D, appropriate antibiotics and possible admission for supportive care
CA-MRSA SKIN ABSCESS
CA-MRSA Pyomyositis

- 34 y.o. male with no previous med hx developed an abscess over his R scapula.
- One week later, he developed severe pain in his R shoulder joint, thought to be rotator cuff.
- Given steroid taper, but pain progressed.
- Presented to hospital two days later, with fever 103, rigors and swelling of his L forearm, L lower leg. WBC 32K, and 4 sets of BC’s with MRSA.
MRSA in LTCF Resident

- 93 y.o. healthy resident of NH presented with 5 days of L facial pustule, progressing to abscess.
- Hx of AVR and PPM
- Fever 103, WBC 22K with 28% bands.
- Painful L facial abscess with expressible pus, 2 sets of +BC, all with MRSA.
- Vancomycin MIC=2.0
- Rx- IV Daptomycin x 4 weeks as echocardiogram negative
Necrotizing Skin Infections

Progression from Cellulitis to Necrotizing Infection
And Toxic Shock Syndrome
**GAS Necrotizing Fasciitis**  
**Clinical Presentation**

- May be heralded by flu-like symptoms before the skin changes appear.
- Nonspecific complaints—nausea, pain, high fever, systemic toxicity. *Pain out of proportion to physical findings.*
- Affected area is *red, hot, shiny without sharp margins and exquisitely tender.*
- More common to present on extremities, including olecranon/pre-patellar bursitis.
- If surgically ignored, cutaneous bullae and skin necrosis occurs and area is no longer tender but anesthetic.
Streptococcal Necrotizing Fasciitis

• In the last few decades, there has been a dramatic increase in the number of life-threatening infections due to Group A Streptococcus associated with Necrotizing Fasciitis and Toxic Shock Syndrome (TSS).
• Pyogenic exotoxins (SPE) produced by GAS lead to rapid tissue destruction/death.
• A surgical emergency!
• Mortality is 20 - 47%
## Signs, Symptoms and Lab Values in GAS Necrotizing Fasciitis/TSS

<table>
<thead>
<tr>
<th>Sign/Value</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever &gt;38</td>
<td>70%</td>
</tr>
<tr>
<td>Confusion</td>
<td>55%</td>
</tr>
<tr>
<td>Hypotension</td>
<td>100%</td>
</tr>
<tr>
<td>Swelling/Erythema</td>
<td>65%</td>
</tr>
<tr>
<td>Creatinine</td>
<td>2.5-3.0</td>
</tr>
<tr>
<td>Bandemia</td>
<td>&gt;40%</td>
</tr>
<tr>
<td>CPK</td>
<td>3,000</td>
</tr>
<tr>
<td>Bacteremia</td>
<td>60%</td>
</tr>
</tbody>
</table>
Streptococcal Cellulitis
After incidental Toenail Clipping
Group A Strep Necrotizing Fasciitis with Toxic Shock
Group A Streptococcus:
Toxic Shock from Olecrenon Bursitis
Capnocytophaga canimorsus Infection: Incidental Dog Bite in Alcoholic

- Often from an innocuous bite.
- Present on average 5-6 days after bite/scratch
- Asplenia, alcoholism and immunosupression all at risk
- Rapid progression to Septic Shock
PNEUMONIA: CAP and HCAP

RECOGNIZING RISKS FOR SEPSIS
Pneumonia: Risk for Sepsis and Treatment Decisions

• Practice guidelines and prediction rules for patients with CAP assist in deciding on in-patient vs. out-patient management

• **CURB-65** scoring: CURB-65 is similar to the new **qSOFA** method (SBP, RR, AMS) to guide hospitalization and predict mortality risk.

• Also, **PSI** and **SevereCAP** scoring may be used for admission decisions and ICU care.
Pneumonia: Risk for Sepsis
Host Factors

- Immuno-agents, especially newer anti-TNF, monoclonal Ab, anti-rejection drugs for IBD, Rheum, Onc, Transplants raise the risk of Legionella, endemic fungal and TB pneumonia
- LTCF residents and recent hospital discharged have increased risk of GNR, MRSA and aspiration, all of which often require I.V. antibiotics due to potential resistant patterns.
- Asplenics at great risk for S.pneumoniae.
- Post-Influenza Staph (incl.MRSA), Streptococcus
POST-PARTUM INFECTIONS

RECOGNIZING RISKS FOR SEPSIS
Post Partum Fever/ Endometritis

- Fever on any 2 of the first 10 days after the first 24 hrs post delivery.
- May be a polymicrobial, mixed infection, but the most severe cases are associated with Group A Streptococcus, Staph Aureus, and Clostridia.
Risk Factors for Post Partum Endometritis

- Premature ROM (and >12 hrs), prolonged labor
- Retained products of conception
- C-section also is increased risk (endometritis overall), notably in later stage of labor.
- Group B strep pre-partum colonization
- Cervico-vaginal virulent flora extend to the uterus, endo- and myometrium
Epidemiology of Group A Strep (GAS): Post Partum Sepsis

- Annual incidence of GAS postpartum infections of 6/100,000 live births. 75,000 deaths worldwide; highest in Asia, Africa and Latin America.
- 84% of invasive post-partum GAS infections follow NSVD.
- Majority occur in days 1 to 4 post partum.
- Only 14% are nosocomial; thus, maternal acquisition pre-delivery is likely culprit. Household GAS pharyngitis (contact with young children as a risk).
Clinical Features of GAS- Post Partum Infections/ Sepsis

- Fever
- Hypotension
- Abdominal Pain
- Tachycardia
- Thin to purulent vaginal discharge.
- Laboratory derangements with High of Low WBC and Bands
- Acidosis and impending MOSF
Treatment of Post Partum Endometritis

• Recognize the urgency of presentation and begin broad spectrum abx (Strep and mixed pathogens)
• Cervical, Blood Cultures.
• May require imaging – Ultrasound, CT to determine uterine status, including gas
• Urgent hysterectomy in the setting progressive sepsis/shock
URINARY TRACT INFECTIONS

RECOGNIZING RISKS FOR SEPSIS
UTI: Recognizing Risks for Sepsis

• Hospital admissions for urosepsis make up a significant proportion of cases that may progress to severe sepsis and septic shock.
• Outpatient scenarios need to be recognized as risks for potential progression to sepsis.
• Significant changes have occurred in both antibiotic resistance patterns (oral agents), and in urologic procedures that will impact that progression to sepsis.
UTI: Risks for Sepsis

- Long term indwelling urinary devices - Foley catheters, ureteral stents, PCN-tubes.
- Obstructing calculi that require intervention
- Recurrent UTI’s and heavy antibiotic pressure
- Increase incidence of ESBL GNR’s in the community setting - lack of oral agents.
- Non-specific/non-urinary symptoms, especially in the elderly and institutionalized.
TRUS-Prostate Biopsy:
Risk of Urosepsis

- TransRectal UltraSound guided biopsy of prostate gland is a routine procedure for diagnosing/staging cancer.
- Risk of post-procedure UTI/Sepsis may occur despite the use of targeted antibiotic prophylaxis.
- Of 2,023 pts. having TRUS-P 62 (3%) became septic despite pre-procedure abx (Urol Int 2010;84 (4) : 395)
- Increasing frequency of ESBL and Quinilone-resistant GNR’s in community.
- Targeted abx prophylaxis by pre-TRUS-P rectal swabs to identify colonizers is not fool proof
ENTERITIS/DIARRHEA

RECOGNIZING RISK FOR SEPSIS
Evaluation of acute diarrhea

**Initial assessment**
Evaluate for: dehydration, duration, and inflammation (fever, blood in stool)

**Symptomatic therapy**
(hydration, alteration of diet)

Severe illness - hypovolemia, bloody stools, fever, ≥6 unformed stools per 24 hours, duration >1 week, severe abdominal pain, elderly (age ≥65 years), or immunocompromised

- **Yes**
  - Illness continues
- **No**
  - Illness resolves

Test for fecal leukocytes
Routine stool culture
Consider nonroutine stool culture or ova and parasites in select situations (see text)
Consider C. difficile if recent antibiotic therapy

**Inflammatory**
(eg, Campylobacter, Shigella, Salmonella, Entero-hemorrhagic E. coli, C. difficile)

- Consider empiric antibiotic therapy while awaiting culture results in the following groups: patients with fever or bloody diarrhea; patients with >8 stools per day, dehydration, symptoms >one week, immunocompromised, if hospitalization considered.
- Consider specific therapy once pathogen identified (see text for indications, type of treatment)

**Noninflammatory**
(eg, Norwalk, Rotavirus, C. perfringens, S. aureus, B. cereus, Giardia, drugs, occasionally IBD)

- Continue symptomatic therapy
- Further evaluation if symptoms persist

C. difficile: Clostridium difficile; E. coli: Escherichia coli; C. perfringens: Clostridium perfringens; S. aureus: Staphylococcus aureus; B. cereus: Bacillus cereus; IBD: inflammatory bowel disease.
Enteritis/Colitis: Risk for Sepsis/Septic Shock

- Bloody diarrhea, fever at presentation. Foodborne.
- Invasive nature of certain pathogens – *Salmonella, Shigella, Campylobacter, E.coli* (EHEC) that may lead to bacteremia and sepsis, septic shock.
- Stool volume losses that may progress to qSOFA scoring (hypotension/tachypnea).
- Antibiotics would be indicated for progression to sepsis in cases other than *E. coli* (EHEC) which could progress to HUS due to toxin release.
C. difficile/ Pseudomembranous Colitis
Risk for Sepsis/Septic Shock

• Over the past 15 years, there has been a 3-fold rise in the incidence of CDI in the US.
• Despite oral antibiotic regimens of metronidazole or vancomycin for an initial CDI, up to 30% of individuals have a recurrence.
• After 2 or more episodes of CDI, it is estimated that 60% of patients with suffer a recurrence.
• Infection with the more virulent strain (NAP1/BI/027), has been associated with higher rates of recurrences.
• Overwhelming toxicity (toxic megacolon) seen with profound CDI especially in elderly and immunosuppressed (lack of Ab vs. toxin)
## Certain Factors Increase the Risk of CDI

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
<th>Disruption of Normal Gut Flora&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Increased Healthcare Exposure&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age older than 64&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Exposure to antimicrobial agents</td>
<td>Extended stay at a hospital and/or residence in a long-term care facility</td>
</tr>
<tr>
<td>Female gender&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Chemotherapy</td>
<td>Contact with contaminated environment and/or health worker hand colonization</td>
</tr>
<tr>
<td>Diabetes&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Gastrointestinal surgery</td>
<td>Direct contact with a patient with CDI</td>
</tr>
<tr>
<td>Immunocompromised&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Manipulation of the gastrointestinal tract, including a nasogastric feeding tube</td>
<td></td>
</tr>
<tr>
<td>Prior episode of CDI&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Acid suppression medications</td>
<td></td>
</tr>
</tbody>
</table>

CDI = C. difficile infection.
Babesiosis: A Risk for Sepsis
Clinical Features

• Similar clinical presentation to malaria, but may range from asymptomatic to fulminant.
• Most severe in asplenics and immunocompromised.
• Fevers, chills, sweats. May see AMS
• Myalgias and arthralgias
• With progressive hemolysis, can progress with sepsis physiology
Babesiosis
Laboratory Features

• Anemia
  – hemolytic anemia
• Thrombocytopenia
• Elevated LFT’s
• **NOT** the leukopenia and atypical lymphocytosis as evidenced in Anaplasmosis.
Anaplasmosis: Clinical Presentation

- Fever – otherwise undetermined - 93%
- Malaise – 94 %
- Headache - 76 %
- Myalgias - 77 %
- Arthralgias – 46 %
- Nausea (38%), Vomiting (26%), Diarrhea (16%)
- Rash is Rare – 6 % Yet, in HME – 31 %
Anaplasmosis Laboratory Features

Several very suggestive laboratory findings often bundled

- Leukopenia
- Immature neutrophils – Marked left shift
- Atypical lymphocytes
- Thrombocytopenia
- Inverse relationship between mean WBC and platelet count and probability of Anaplasmosis
- Rise in LFT’s, notably transaminases and LDH
Anaplasmosis: Complications

• Rarely, fulminant cases of untreated Anaplasmosis and HME can occur.
• Complications may include acute renal failure, respiratory failure and shock.
• Immunocompromised patients, including HIV, may have a complicated course, especially with HME.
• Case fatality rates are low.

Anaplasmosis - < 1% and HME about 3%.
Rapid Assessment Tool for Prediction of Sepsis --- q SOFA
Get up off the Couch!!!

• Just to reinforce- q SOFA is a quick clinical tool for prediction of potential sepsis – NO LABS.
• Tachypnea – RR > 22
• Hypotension – SBP < 100 mmHg
• Altered Mental Status – GCS <13
Reminders for Providers, Patients and Families: Sepsis Warning Signs

• Decrease, or darkening (concentrating) of urine output.
• Increase in finger stick blood glucose in diabetics.
• Ongoing fevers, chills, rigors despite treatment.
• Cool extremities or mottling of skin.
• Altered mental status (recognized by others)
Antibiotic Stewardship vs. Risk for Sepsis
Not A Conflict in Strategies

• There is a growing focus on the appropriate use of all antibiotics, both in and out of hospitals- with the risk of increasing resistance, collateral damage

• Often this includes empiric prescribing for URI and non-specific febrile cases (viral syndromes)

• There should be no confusion or misconception- urgent antibiotic therapy (p.o. or I.V.) is needed for bacterial infections to prevent progression to sepsis and septic shock.
Questions & Feedback