Antimicrobial Stewardship Dilemmas in Clinical Practice:
A Case Based Discussion

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CASE # 1

This is a 54 year-old female readmitted to the hospital for probable deep sternal SSI. Three weeks earlier she underwent a CAB surgery, MV repair, and an AVR. She received “appropriate” surgical antibiotic prophylaxis. She has type 2 diabetes mellitus.

On readmission she was febrile (102°F), BP 90/60 mmHg, HR-120 bpm, RR 20; lungs decreased breath sounds on left, no rubs, had purulence from lower sternum. The white blood count was 18,000 cells/mm³ with 15% bands, platelets 115,000, PT INR 1.5, lactate 3.1 mEq/L, SCr 2.1 mg/dL, glucose 230, blood cultures were drawn

SSI=surgical site infection; CAB=coronary artery bypass; MV=mitral valve; AVR=aortic valve replacement
Based on SEP-1 Criteria how would you classify this patient?

- Sepsis
- Severe sepsis
- Septic shock
- None of the above
Severe Sepsis Organ dysfunction (NQF/CMS)

- (SBP)<90 mm Hg or mean arterial pressure <70 mm Hg or a SBP decrease >40 mm Hg or <2 SD below normal for age or known baseline
- Creatinine > 2.0 mg/dl (>50% baseline) or Urine Output < 0.5 ml/kg/hour for > 2 hours
- Bilirubin > 2 mg/dl (>2X ULN)
- Platelet count < 100,000, Coagulopathy (INR >1.5 or aPTT >60 secs)
- Lactate > 2 mmol/L
- **Septic shock:** Septic shock requires the presence of severe sepsis as above AND as sepsis-induced hypoperfusion persisting despite adequate fluid resuscitation (and/OR lactate > 4 mmol/L-NQF).
Case # 1 continued

• ID was called into the emergency department (ED)

• Gram stain was performed which showed
Which of the following antibiotics would be best to start empirically in this patient?

a. Daptomycin
b. Cefazolin
c. Vancomycin
d. Vancomycin + piperacillin/tazobactam
e. Vancomycin + cefazolin
Case #1 continued

- Vancomycin was started
- At 12 hours blood cultures were positive for gram-positive cocci in clusters
- Culture from sternum was identified as *Staphylococcus aureus* the next morning with sensitivities pending
- Patient was taken to surgery for sternal debridement
- TEE indicated a vegetation on her AV

TEE=transesophageal echocardiogram; AV=aortic valve
Scenario #1 Traditional Method
Suspected Infection

• Fluid or Tissue Sample
• Gram Stain
  – Bacteria present? If so, Gram-negative or positive?
  – Results in minutes
• Sample incubated in culture media
  – Usually 24 hours for growth
• Biochemical testing to determine the organism
  – Minutes to 24 hours
• Susceptibility testing
  – Another 24-48 hours
  – At 48 hours susceptibilities revealed methicillin-
susceptible *S. aureus* (MSSA)
Scenario #2 Rapid Molecular Methods

- Technologies available
  - Polymerase chain reaction (PCR)
  - Multiplex PCR
  - Nanoparticle Probe Technology
  - Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS)
  - From blood culture MALDI confirmed *S. aureus* and PCR indicated this was a MSSA within 4 hours of + blood culture. **Total time 16 hours vs. 48 hours by traditional methods**
Rapid testing of positive blood culture bottles

1. Blood collection
2. Inoculation of blood into blood culture bottles; transportation to laboratory; loading onto blood culture instrument
3. Removal of positive bottles from blood culture instrument (when detected); Removal of negative bottles from blood culture instrument (5 days)
4. Removal of blood culture from positive blood culture bottle
5. Gram stain and subculture for identification and antimicrobial susceptibility testing
6. Identification and antimicrobial susceptibility testing
   - Isolate identification by MALDI-ToF MS or other methods
   - Antimicrobial susceptibility testing
7. Direct from blood organism detection, identification and antimicrobial susceptibility testing
8. Rapid identification (and antimicrobial susceptibility testing) using molecular method
9. Rapid identification by direct from positive blood culture bottle MALDI-ToF MS or MALDI-ToF MS performed following a short duration of subculture incubation
10. Rapid antimicrobial susceptibility testing
Rapid Identification of Positive Blood Cultures (N=118)

<table>
<thead>
<tr>
<th>Panel</th>
<th>Targets</th>
<th>Accuracy Rate, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>FilmArray BCID Panel, Biofire Diagnostics, Salt Lake City, Utah</td>
<td>• Detects 19 bacterial targets, 3 resistance genes, and 5 yeast targets</td>
<td>91-92</td>
</tr>
<tr>
<td>Verigene BC-GP and BC-GN-RUO, Nanosphere, Inc., Northbrook, IL</td>
<td>• BC-GP test has 12 bacterial targets and 3 resistance markers</td>
<td>90-96</td>
</tr>
<tr>
<td></td>
<td>• BC-GN-RUO test has 9 bacterial targets and 6 resistance markers</td>
<td>94-98</td>
</tr>
</tbody>
</table>
Ideal Test

• Accurate – sensitive and specific
• Simple to perform
• Fast turn-around-time
• On-demand testing
• Cost-effective-value proposition
• Broad range of specimen types
• **Actionable results**
Which of the following antibiotic therapies should be used now for this patient?

a. Continue vancomycin
b. Switch from vancomycin to cefazolin
c. Switch from vancomycin to nafcillin
d. Switch from vancomycin to linezolid
β-lactam vs Vancomycin for MSSA Bacteremia

30-Day In Hospital Mortality (%)

Antibiotic Regimen

*Statistically significant
• PCR MRSA/SA BC system
  – Group 1 – immediate determination and notification of gram positive cocci (GPC) in blood culture (BC)
  – Group 2 – historical cohort with standard microbiological testing

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-\textit{S. aureus} species receiving no antistaphylococcal Tx</td>
<td>76%</td>
<td>55%</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>MRSA Tx received</td>
<td>6%</td>
<td>25%</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Mean time to appropriate Tx for MSSA</td>
<td>5.2 h</td>
<td>49.8 h</td>
<td>.007</td>
</tr>
</tbody>
</table>

Duration of unnecessary drug ↓ 61 hours / patient
Comparison of median time to identification, susceptibility results, and time to antibiotic modifications

<table>
<thead>
<tr>
<th>Timeline, hours (h)</th>
<th>0</th>
<th>12</th>
<th>24</th>
<th>36</th>
<th>48</th>
<th>60</th>
<th>72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (n=169)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCID (n=147)</td>
<td>*</td>
<td>ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCID+ stewardship (n=165)</td>
<td>* *</td>
<td>ID</td>
<td></td>
<td></td>
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</tbody>
</table>

Antimicrobial stewardship oversight in BCID+stewardship group

ID  Organism identification  AST  Phenotypic antimicrobial susceptibility report  D  De-escalation  E  Escalation

Among subset of patients with organisms on BCID panel (n=481)
*significant vs. control
*significant vs. control and BCID

Clin Infect Dis 2015; 61:1071
Original Investigation

Association of a Bundled Intervention With Surgical Site Infections Among Patients Undergoing Cardiac, Hip, or Knee Surgery

Marin L. Schweizer, PhD; Hsiu-Yin Chiang, MS, PhD; Edward Septimus, MD; Julia Moody, MS; Barbara Braun, PhD; Joanne Hafner, RN, MS; Melissa A. Ward, MS; Jason Hickok, MBA, RN; Eli N. Perencevich, MD, MS; Daniel J. Diekema, MD; Cheryl L. Richards, MJ, LPN, LMT; Joseph E. Cavanaugh, PhD; Jonathan B. Perlin, MD, PhD; Loreen A. Herwaldt, MD
S. aureus Positive

- **MRSA +**
  - Yes
  - Decolonize with intranasal Mupirocin*** ointment BID x 5 days
  - CHG*** bathing (daily x 5 days, using wipes or liquid)
  - Cefazolin* plus Vancomycin**

- **MSSA +**
  - Yes
  - Decolonize with intranasal Mupirocin*** ointment BID x 5 days
  - CHG*** bathing (daily x 5 days, using wipes or liquid)
  - Cefazolin*
Hospitals began implementing intervention in June 2012.

Complex S. aureus SSI rate from 36/10,000 operations to 21/10,000 operations RR 0.58 CI 0.37-0.92.
Preoperative Screening and Decolonization – Preoperative identification of patients who are nasal carriers of MRSA or MSSA and decolonization using intranasal mupirocin (Bactroban Nasal, and others) and chlorhexidine (Peridex, and others) have been shown to decrease surgical site infections following some procedures (primarily cardiac and orthopedic)
Case #2

• Daughter brings dad back to your office with increased confusion and cloudy foul smelling urine.
• Daughter tells you that every time her dad gets more confused he always has a UTI. He was last seen 3 months ago with an ESBL *E. coli* infection treated with outpatient carbapenem.
• Patient on multiple medications including SSRIs, PPI, and dementia medications
• Vital signs normal, no suprapubic or CVA pain, WBC normal, creat 1.7 (was 1.2), Na 128; UA-shows + leukocyte esterase, negative nitrite micro-pyuria and bacteriuria, >5 squamous cells/LPF

What would you do?
A urine that is cloudy and foul smelling is consistent with a UTI

- True
- False
Answer

• Urine color or odor alone should **not** be used to diagnose or treat

• Inspection for urine color is not helpful in diagnosing UTI in women. The sensitivity, specificity, and positive and negative predictive values were 13.3%, 96.5%, 40.0%, and 86.3%, respectively

• Foul-smelling urine is an unreliable indicator of infection, and is usually dependent on patients’ hydration status and concentration of urea in the urine

---

1. Research and Infectious Diseases

2. Research and Infectious Diseases
If the urine has bacteriuria and/or pyuria, the patient has a UTI

• True
• False
Answer

• The presence of bacteria in the urine on microscopic examination or by positive culture without UTI symptoms is **not** an indication of a UTI due to the possibility of contamination and asymptomatic bacteriuria¹

• UTI is **not** a laboratory-defined diagnosis. Diagnosis should be based on clinical symptoms whenever possible, confirmed by positive urine microscopy and/or culture
Answer

• A urinalysis with positive leukocyte esterase should not be used alone to support a diagnosis of UTI or start antimicrobial therapy in any patient population.

• A dipstick leukocyte esterase test has high sensitivity and specificity for the presence of quantitative pyuria, 80–90% and 95–98%, respectively.\(^1\)

• Symptoms are usually required for the diagnosis of UTI; pyuria or bacteriuria alone is not an indication for antimicrobial therapy and can result in an overtreatment rate of up to 47%.\(^2\)

My patient has a negative nitrite, therefore my patient does not have a UTI

- True
- False
Answer

• Urine nitrite has a high true-positive rate for bacteriuria. However, only *Enterobacteriaceae* produce nitrite from nitrate. Nitrite is *not* produced by *Staphylococcus saprophyticus*, *Pseudomonas* species, or *Enterococcus* species.

• Even if both leukocyte esterase and nitrite analyses are positive, the sensitivity for bacteriuria was only 48% (95% CI 41–55%), and specificity was 93% (95% CI 90–95%) among elderly patients, indicating the need to correlate with clinical symptoms that suggest a UTI.

• A negative leukocyte esterase and a negative urine nitrate largely rule out infection.
Patients with asymptomatic bacteriuria will progress to a UTI and therefore should be treated?

- True
- False
Answer

• Symptomatic UTI is substantially less common than asymptomatic bacteriuria\(^1\)
• Asymptomatic bacteriuria has not been associated with long-term negative outcomes such as pyelonephritis, sepsis, renal failure, or hypertension\(^1\)
• The prevalence of bacteriuria in elderly institutionalized patients without indwelling catheters varies from 25–50% for women and 15–49% for men, and increases with age.\(^2\) Bacteriuria and pyuria in the elderly is, to a large degree, an expected finding. Bacteriuria also increases with age in non-institutionalized patients

And Now the Rest of the Story

- The physician referred patient to ED for admission
- The patient was cultured and started meropenem based on prior culture
- Admission diagnosis is UTI
- IV fluids
- At 24 hours dad has improved
- No fever, repeat creat ↓ 1.4
- Blood culture NG
- At 24 hours urine grew *Pseudomonas aeruginosa*
- At 48 hours susceptibilities indicated organism was resistant to meropenem but susceptible to ciprofloxacin
What would you do now?

1. Add ciprofloxacin IV
2. Discontinue meropenem and start PO ciprofloxacin
3. Discontinue meropenem
4. Continue meropenem since patient was improving
And Now the Rest of the Story Part 2

- Based on susceptibility, dad was changed to ciprofloxacin.
- On day 5 dad is completely back to normal mentally but has dizziness. He has had no fever.
- On day 6 you are called because dad is now having “diarrhea” (3 unformed stools in last 24 hours).
What you would do now?

1. Order loperamide
2. Discontinue ciprofloxacin
3. Observe
4. Order a test for *C. difficile*
5. Order a test for *C. difficile* and discontinue ciprofloxacin
And Now The Rest of the Story Part 3

• On day 7 patient continues to have 3-4 loose stools per day. On exam no abdominal tenderness. No fever and WBC is normal. The daughter has just read an article on “antibiotic colitis” and wants dad tested
Which test would you order?

- EIA toxin test
- PCR
- GDH EIA combo
- Cell culture cytotoxicity
- None of the above
## C. difficile Testing Strategies

<table>
<thead>
<tr>
<th>Testing Option</th>
<th>Result</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIA Toxin Test (A&amp;B)</td>
<td>Toxin Pos <em>(high specificity)</em></td>
<td>Presume CDI</td>
</tr>
<tr>
<td>EIA Toxin-No longer recommended as stand alone test</td>
<td>Toxin Neg <em>(low sensitivity)</em></td>
<td>Perform PCR/NAAT</td>
</tr>
<tr>
<td>GDH and Toxin A&amp;B Combo Test</td>
<td>GDH Neg <em>(high sensitivity)</em></td>
<td>No CDI, no further testing</td>
</tr>
<tr>
<td></td>
<td>GDH Pos, Toxin Pos</td>
<td>Presume CDI</td>
</tr>
<tr>
<td></td>
<td>GDH Pos, Toxin Neg <em>(GDH has low specificity)</em></td>
<td>Perform PCR/NAAT</td>
</tr>
<tr>
<td>PCR/NAAT <em>(Illumigene, Cepheid, BD GenProbe)</em></td>
<td>PCR/NAAT Pos <em>(high sensitivity but only mod specificity, does not distinguish true CDI from asymptomatic carriers)</em></td>
<td>CDI or possible carriage; perform clinical assessment</td>
</tr>
<tr>
<td></td>
<td>PCR/NAAT Neg</td>
<td>No CDI, no further testing</td>
</tr>
</tbody>
</table>

- Test only liquid specimens that conform to shape of the cup (except ileus)
- PPV dependent upon disease prevalence
- Test methods with higher sensitivity and PPV reduces repeat testing
You decide to order *C. difficile* PCR (the only test in your facility) which come back positive. You notify the daughter who wants her dad treated.
Which drug would you start?

- Metronidazole
- Fidaxomycin
- PO vancomycin
- PO vancomycin + metronidazole
## Stratification by Severity

<table>
<thead>
<tr>
<th>Severity</th>
<th>Clinical Manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asymptomatic carrier</strong></td>
<td>No symptoms or signs</td>
</tr>
<tr>
<td><strong>Mild</strong></td>
<td>Mild diarrhea (3 to 5 unformed bowel movements per day), afebrile status, mild abdominal discomfort or tenderness, and no notable laboratory abnormalities</td>
</tr>
<tr>
<td><strong>Moderate</strong></td>
<td>Moderate non-bloody diarrhea, moderate abdominal discomfort or tenderness, nausea with occasional vomiting, dehydration, white-cell count &gt;15,000/mm³, and blood urea nitrogen or creatinine levels above baseline</td>
</tr>
<tr>
<td><strong>Severe</strong></td>
<td>Severe or bloody diarrhea, pseudomembranous colitis, severe abdominal pain, vomiting, ileus, temperature &gt;38.9°C, white-cell count &gt;20,000/mm³, albumin level &lt;2.5mg/dl, and acute kidney injury</td>
</tr>
<tr>
<td><strong>Complicated</strong></td>
<td>Toxic megacolon, peritonitis, respiratory distress, and hemodynamic instability</td>
</tr>
</tbody>
</table>
Metronidazole has been shown to be globally inferior to vancomycin
Comparative Effectiveness of Vancomycin and Metronidazole for the Prevention of Recurrence and Death in Patients With *Clostridium difficile* Infection

* Statistically significant
And Now The Rest of the Story Part 5

You start PO metronidazole. “Diarrhea” is slightly improved, but dad is now nauseated and more dizzy. The daughter asks for an ID consult.
What did the ID do?

- Orders a stool for EIA
- Stops ciprofloxacin
- Changes metronidazole to PO vancomycin
- Continues metronidazole and ciprofloxacin
- None of the above
PCR diagnostic strategies may detect patients colonized with CDI but not infected.

UK: prospective, multicenter study of suspected CDI patients tested for cytotoxicity assay (CTA), cytotoxigenic culture (CC), or nucleic acid amplification test (NAAT).

Mortality increased significantly in CTA positive patients (OR 1.61, 95% CI 1.12–2.31).

Overdiagnosis of *Clostridium difficile* Infection in the Molecular Test Era

Figure 2. Kaplan-Meier Curves of Time to Resolution of Diarrhea by *Clostridium difficile* Test Group

![Graph showing Kaplan-Meier curves for time to resolution of diarrhea by *Clostridium difficile* test group.](image-url)
The Finale

- ID initially stopped the ciprofloxacin since after review ID felt patient had ABU
- Pending EIA switched metronidazole to PO vancomycin
- EIA comes back negative so ID stops PO vancomycin
Lesson Learned

• What are the negative effects of overtreatment of ASB?
  – Overtreatment hurts **individuals**
    • From antibiotics
    • Gastrointestinal side effects
    • Risk of *Clostridium difficile* infection
    • Collateral damage
      – Induce resistant flora
      – Destroy healthy microbiome
  – Diagnostic delays
  – Overtreatment hurts **all of us**
  – Costs
  – Spread of resistant organisms/ *C diff*
  – Falsely elevated UTI rates
Case # 3

- BT is a 51-year Hispanic female admitted to the hospital for subjective fever, chills, weakness, polyuria without dysuria, and lower abdominal discomfort. Patient has diabetes but did not obtain her last refill for metformin. She was triaged at 1600.
- Non toxic alert PE: T-99.2°F, BP 95/60 mmHg, HR 120 bpm, RR 16/min; lift-sided abdominal pain, no rebound or CVA tenderness-BS+
- Lab: WBC 23,000 cells/mm³, 24% bands, platelets 126,000/ mm³, SCr 1.3 mg/dL; BG 614 mg/dL, alb 1.9 g/dL, U/A +glu and ket, prot, WBC 5-7 cell/mm³, few bacteria; lactate 3.5 mEq/L, alk phos 191 units/L, ALT 32 units/L. PT/PTT normal. Lab was available at 1830.
- CXR clear, blood cultures drawn.
Sepsis: Defining a Disease Continuum

**SIRS (Systemic Inflammatory Response Syndrome)**

- **Adult Criteria**
  - A clinical response arising from a nonspecific insult, including ≥ 2 of the following:
    - Temperature: > 38.3°C or < 36°C
    - Heart Rate: > 90 beats/min
    - Respiration: > 20/min
    - WBC count: > 12,000/mm³, or < 4,000/mm³, or > 10% immature neutrophils

**Sepsis**

- Infection (Confirmed or suspected)

**Severe Sepsis**

- Sepsis + New onset organ dysfunction
  - Altered Mental Status
  - ↑Creatinine > 2 or >50% from baseline for CKD
  - Acute Oliguria
  - Systolic BP <90 or MAP <65
  - Systolic ↓ > 40 mmHg from baseline
  - Lactic acid > 2mmol/L
  - Plt < 100,000
  - aPTT > 60 sec
  - Tbili > 2mg/dL
  - INR > 1.5

**Septic Shock**

= refractory hypotension after 30ml/kg IVFs OR lactate > 4mmol/L
What about New Definitions (SEP-3)?

- **Sepsis**: NO
  - Infection plus two or more sequential organ failure assessment points (qSOFA)
    - systolic hypotension of 100 mm Hg or below YES
    - tachypnea of at least 22 breaths/min NO
    - altered mental state NO

- **Septic shock** NO
  - Fluid-unresponsive hypotension
  - administration of vasopressors or vasoactive medication to maintain mean arterial blood pressure of 65 mm Hg or higher after adequate fluid resuscitation
  - high lactate (more than 2 mmol/L)
Case #3 continued -
And Now the Rest of the Story

- An IV was started at 1800
- Insulin and fluids were given a 500-mL bolus followed by lactated Ringer’s at 125mL/hour
- At 1900 the patient was transferred to the telemetry unit
- At 0330 the next day 1 gram of ceftriaxone was given
- At 0800 her BG was down to 312 mg/dL, her lactate was 3 mEq/L, and her platelet count had decreased to 23,000 cells/mm³, SCr was down to 0.7 mg/dL, WBC decreased to 12,600 cells/mm³; PCT 26
- 1100 microbiology reports + blood cultures for gram-negative rods
- 1130 patient returns from CT scan
- Afebrile
What is your diagnosis?
- Diverticulitis
- Emphysematous pyelonephritis
- Rupture appendix
- Psoas abscess
Emphysematous Pyelonephritis

- > 90% have poorly controlled diabetes mellitus
- Male: female 1:5
- 2/3 involve the left kidney
- *E. coli* and *Klebsiella sp* are the most common pathogens

Our patient grew *E. coli* resistant to ampicillin, amp/sulb, FQ, and TMP/SMX
Did the care provided in case #3 meet the SEP-1 CMS standard?

a. Yes

b. No
SEP-1 CMS Compliance

Early Management Bundle: Severe Sepsis/Septic Shock

• Numerator: Patients who receive ALL of the following:
  – Received within 3 hours of presentation of severe sepsis
    • Initial lactate level YES
    • Broad-spectrum or other antibiotics administered NO
    • Blood cultures drawn prior to antibiotics YES
  – And received within 6 hours of presentation of severe sepsis:
    • Repeat lactate level only if initial lactate level is elevated YES but not in 6 hours
  – And only if septic shock present or lactate ≥4 mEq/L DNA
    • Resuscitation with 30 ml/kg crystalloid fluids

SEP 3 and SEP-1

- **Time is tissue!**
  - Continue early recognition and implementation of the Sepsis Bundle
- **Further testing and validation needed**
  - CMS
  - NQF
  - qSOFA
- **Unintended consequences**
  - Clinicians under pressure from SEP-1 may feel obligated to give all patients with possible sepsis broad-spectrum antibiotics and fluids regardless of probability of sepsis
  - SEP-1 may cause confusion between clinicians using the new definition (SEP 3) and quality teams using old definitions for SEP-1
SEP-1 Deficiency

- **Lack** of de-escalation evaluation as part of the measure despite the recommendation in the Surviving Sepsis Campaign

• Clinical Judgment
  – Clinical judgment an essential path to acquiring the reflective ability and knowledge to understand the condition and needs of the patient
  – Requires intellectual and professional maturity, the ability to pay attention, to reason and summarize data

Margot Phaneuf, RN
Case # 4

- Mr JB is a 27 year-old male who presents with a 3 days history of increasing sore throat, difficulty swallowing, and fever to 101°

VT: T 101.2, BP 116/76, P 94, RR 24

Mouth: white exudates in posterior pharynx, mild pharyngeal and tonsillar erythema, tonsils are 3+

Neck: tender LAD in anterior cervical chains

Pulm: clear to auscultation, no wheezes, rales, or rhonchi
Per IDSA guidelines, what is the recommended next step in the management of this patient?

1. Empiric treatment with an antibiotic
2. Rapid antigen detection test (RADT) for Group A *Streptococcus*
3. Symptomatic treatment only
4. None of the above
Approximately what percentage of adult sore throat patients with all 4 Centor criteria (no cough, tender cervical LAD, tonsillar exudate, fever) will have GAS pharyngitis?

A) 34%
B) 56%
C) 78%
D) 92%
Group A Streptococcal Pharyngitis

“Clinical features alone do not reliably discriminate between GAS and viral pharyngitis…”
-2012 IDSA Guidelines for GAS Pharyngitis

- Rapid strep test should be used to diagnose GAS pharyngitis
  - Only ~10% of sore throat visits among adults are due to GAS
  - 15-30% of sore throats in pediatrics
- Half of adults with all 4 Centor criteria will NOT have GAS
  - Positive predictive value of ~56%
- Test sore throat visits with 2 or more Centor criteria:
  - Fever, tender and swollen anterior cervical lymph nodes, absence of cough, tonsillar exudates or swelling
Antibiotic Prescribing for Adults with Pharyngitis

GAS prevalence in adults
Group A Streptococcal Pharyngitis

- Patients with **negative rapid strep** results:
  - Antibiotic treatment is NOT recommended
  - Throat cultures are appropriate for children and adolescents, but not for adults
- Rapid strep testing should generally not be done in children <3 years
- **Amoxicillin** and **penicillin V** remain first-line therapy
- GAS resistance to **macrolides** is increasingly common (up to 48%)
  - Resistance to penicillin has never been documented
Acute Pharyngitis: Take Home Points

- Diagnosis and treat group A streptococcal pharyngitis based on RADT results

- Prediction rules like Centor are useful for deciding which patients should receive a rapid strep
  - Do not use prediction rules to diagnose GAS pharyngitis or to determine which patients to treat with an antibiotic

- Antibiotics are not routinely recommended for RADT negative pharyngitis
A pessimist sees the difficulty in every opportunity, an optimist sees the opportunity in every difficulty

Winston Churchill