Top Curbside Consult Questions in Inpatient ID

Management of the Hospitalized Patient
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Disclosures

- I have no disclosures.

Learning Objectives

- To know the situations in which formal in-person consultation is preferred over curbside consultation
- To develop an approach to common ID questions that arise in the inpatient setting.

Roadmap

- A Brief Word on Curbsides vs. Formal Consults
- Case-Based Approach to the Top 5 Curbside Consult Questions in ID for 2016
  - Line management in CLABSI
  - Asymptomatic bacteriuria vs UTI
  - Zika testing and pregnancy counseling
  - Treatment of Enterococcus and Streptococcus bacteremia
  - Oral options for ESBL UTI
Curbsides vs Formal Consults

- Recent study of 47 curbsides vs. formal consults
  - Medicine consult
  - Curbside followed by a formal consult by a colleague
  - Curbsided providers were not allowed to look in the chart

- Results:
  - Information in curbside was inaccurate/incomplete in 51%
  - Formal consult changed Rx in 60% (36% "major changes")
  - If information was inaccurate/incomplete then a formal consult changed Rx in 92% (45% "major changes")


Are Curbsides Okay?

- Need to balance patient safety, provider workload, education

- Curbside volume in ID
  - In the literature: 20-120 curbsides/month
  - At UCSF Medical Center: 60 curbsides/mo (15 hours/mo)

- Impossible in most practices to convert all curbsides into formal consults


Is This An Appropriate Curbside?

What is the dose of ertapenem when the CrCl is <30?

1. Yes
2. No
Is This An Appropriate Curbside?

30 y/o G1P0 admitted to the OB service with fever and headache, now improved after 1 day of amp/gent. Blood cultures are negative to date. The patient is really worried she has *Listeria* meningitis because she ate deli lunchmeat 2 days ago. We don’t think she has meningitis and want to discharge her. We just wanted to make sure this is okay with you – okay?

Is This An Appropriate Curbside?

1. Yes

2. No

Is This An Appropriate Curbside?

If a patient has mild cystitis due to VRE that is sensitive to doxycycline, can I use that drug to treat a UTI?

Is This An Appropriate Curbside?

1. Yes

2. No
What is an Appropriate Curbside?

- The Goldilocks of Curbside Consultation
  - Not too simple: the answer can be easily looked up
  - Not too complicated: the answer requires nuanced clinical judgment or interpretation of a lot of data
  - Just right: Hypothetical, factual question

- We also tell our ID Fellows that it should probably be a consult if:
  - You need to look up the answer
  - It’s early in the year

The Special Case of *S. aureus* Bacteremia

- Benefit of ID consultation versus no consultation
  - Adherence to quality indicators for SAB:
    - More likely to get echocardiogram and repeat blood cultures
    - Improved antibiotic choice and duration
    - Removal of prosthetic devices/source control
  - Detection of metastatic foci of infection
  - Risk of relapse
  - Mortality (by 20-50%)

Curbsides for *S. aureus* Bacteremia?

- Curbside consult is associated with:
  - Less identification of deep infectious foci
  - Less likely to receive the proper duration of therapy
  - 90d mortality by > 2-fold compared to formal consult

- UCSF: automatic formal consult policy at all 3 hospitals for patients with SAB

- Formal consult for SAB is preferred if available

Curbside #1

A 65 y/o man with ESRD on HD through a tunneled right IJ line is admitted with fever and found to be bacteremic on both line and peripheral cultures with *Klebsiella pneumoniae*. Line culture turned positive 4 hours before the peripheral culture, indicating the line as the source. He has very poor access options. Do we have to take out the line?
Do You Have to Change the Line?

1. Yes, it’s a GNR

2. No, you can consider line salvage

CLABSI: Diagnosis

- Clinical findings at exit site in <3%
- Catheter tip culture:
  - (+) peripheral bxc and > 15 cfu/plate from catheter tip
  - 80% sensitive, 90% specific
  - But >80% of catheters removed unnecessarily

CLABSI: Differential Time to Positivity

- Allows for diagnosis without removing the line
- Culture from line + peripheral blood at the same time
- CLABSI = blood culture drawn from central line turns positive at least 2 hrs before the peripheral culture

- Test characteristics
  - 85-95% sensitive
  - 85-90% specific
  - Not as good for Candida (b/c slow-growing)

When to Remove the Line

<table>
<thead>
<tr>
<th>Complicated Infections</th>
<th>Virulent Organisms</th>
</tr>
</thead>
</table>
| 1. Severe sepsis        | 1. *Staphylococcus aureus*
| 2. Persistent bacteremia (>72h of appropriate ABx) | 2. *Pseudomonas*
| 3. Septic thrombophlebitis | 3. *Candida*
| 4. Exit site or tunnel infection | |
| 5. Metastatic infection: endocarditis, osteomyelitis | |

Line Management for Other Organisms

<table>
<thead>
<tr>
<th>Organism</th>
<th>PICC/Short-term CVC</th>
<th>Tunneled Cath/Port</th>
<th>HD Catheter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coag-negative staphylococci</td>
<td>Remove or retain</td>
<td>Remove or retain</td>
<td>Remove, retain, or guidewire exchange</td>
</tr>
<tr>
<td>Enterococcus</td>
<td>Remove</td>
<td>Remove or retain</td>
<td>Remove, retain or guidewire exchange</td>
</tr>
<tr>
<td>Other GNRs (not Pseudomonas)</td>
<td>Remove</td>
<td>Remove or retain</td>
<td>Remove, retain or guidewire exchange</td>
</tr>
</tbody>
</table>

Less aggressive with line removal

Clinical judgment based on:
- Severity of infection
- Access options
- Risk of line removal

Antibiotic Lock Therapy

- Goal is to get supra-therapeutic ABx concentrations to penetrate biofilms
- Cannot use if exit-site/tunnel infection
- Logistics
  - Work with pharmacy and nursing
  - Usually mix with heparin
  - Dwell times are variable but usually <48h
  - Common ABx:
    - Gram positives: linezolid, vancomycin, cefazolin
    - Gram negatives: ceftazidime, ciprofloxacin, gentamicin

Line Salvage: General Principles

- Only in patients whose symptoms resolve within 2-3 days and no evidence of metastatic infection
- Studied in long-term catheters (intra-luminal infection)
- Give systemic ABx + antibiotic lock therapy for 7-14 d
- Get surveillance blood cultures (1 wk after Abx stop)

Antibiotic Lock Efficacy by Organism (%)

<table>
<thead>
<tr>
<th>Organism</th>
<th>Overall Success Rate (%)</th>
<th>CoNS</th>
<th>GNRs</th>
<th>S.aureus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line removal</td>
<td>Systemic Abx</td>
<td>Systemic Abx + Lock</td>
<td>Systemic Abx</td>
<td>Systemic Abx + Lock</td>
</tr>
<tr>
<td></td>
<td>50-43%</td>
<td>90-75%</td>
<td>&gt;90%</td>
<td>80%</td>
</tr>
</tbody>
</table>

Line Salvage with Antibiotic Lock Therapy
What About Guidewire Exchange?

- Goal is to eliminate biofilm
- How good is it?
  - Limited data, mostly HD catheters
  - Seems at least equal to ABx lock (~70% cure), maybe better
  - Likely better than ABx lock for S. aureus
- When to consider using?
  - If you want to salvage an HD line but can’t use lock therapy
  - If catheter removal is clearly indicated but not feasible (especially for S. aureus)
  - No tunnel or metastatic infection, symptoms improving, procedure is feasible


Line Management: Take-Home Points

- Differential time to positivity (line positive ≥ 2 hours before peripheral) allows for diagnosis of CLABSIs without line removal
- All lines should be removed for:
  - Any complicated infection
  - S. aureus, Pseudomonas, or Candida
- Line management for other organisms depends on line type (lower barrier to remove line for short term catheter > long-term catheter > HD catheter)
- Use antibiotic lock when possible for line salvage

Curbside #2

55 y/o woman in the ICU after a complicated spinal surgery. She remains intubated, spikes a fever on POD#3 and is pan-cultured.
- She has thick secretions and a new CXR infiltrate.
- mBAL is growing MRSA.
- UA (catheter): 25-50 WBC, Ucx positive for VRE.

Do You Need to Treat the VRE?

1. Yes
2. No
3. Not sure
Asymptomatic Bacteriuria

ASB = (+) urine culture AND no signs/symptoms of UTI

Asymptomatic Bacteriuria is COMMON!

- Seen in up to:
  - 25% of elderly, diabetic, or HD patients
  - 50% of patients in long term care facilities
  - 25% of patients with short-term catheters, ~100% with long-term catheters

- Of positive urine cultures obtained on the wards after hospital admission \( \rightarrow \) ~90% are ASB

Hazards of ASB Treatment

- Side effects of antibiotics
- Risk of Cdiff
- Risk of resistance
- May increase risk of recurrent UTI by getting rid of “good” interfering bacteria

Exceptions: Who With ASB Should Be Treated?

- Pregnant women
  - Risk pyelo, premature delivery

- GU procedures w/mucosal bleeding
  - Post-procedure bacteremia/sepsis

- Immunosuppressed patients?
  - Renal transplant in the first 3 months?
  - Neutropenia?
What About Patients Undergoing Arthroplasty?

- ASB is associated with \( \uparrow \) risk of PJI, but:
  - Treatment for ASB does not \( \downarrow \) risk of joint infection
  - Bacteria isolated in urine ≠ bacteria isolated in joint
  - No \( \downarrow \) risk of post-operative UTI

- ASB is likely a surrogate marker of infection risk

- Pre-op screening, treatment of ASB not recommended


The Heart of the Problem

- It’s Hard to Ignore a Positive Culture

- Proof of concept study:
  - At Mount Sinai, 90% of their inpatient urine cultures were ASB, and 50% were treated with ABx
  - They stopped reporting these (+) urine cultures in the EMR
  - Results:
    - The % of ASB that was treated dropped by 80%
    - No untreated UTIs and no sepsis


How To Distinguish ASB vs. UTI?

- Does the UA help? \( \Rightarrow \) Yes, but only if negative
  - Pyuria is very common in ASB, e.g. \( \geq 50\% \) of catheterized patients with ASB
  - But the absence of pyuria suggests an alternative dx
  - Always order a UA when ordering a urine culture

- Does the organism help? \( \Rightarrow \) NO
  - The same organisms cause ASB and UTI

- Use clinical context – does the patient have signs/symptoms of UTI?


What if I Can’t Assess Symptoms?

How to define UTI in patients with a catheter or AMS

- Signs/symptoms consistent w/ UTI
  - Fever, rigors, AMS, malaise
  - Flank pain, CVAT, pelvic pain
  - Acute hematuria
  - Spinal cord injury: 0 spasticity, autonomic dysreflexia, unease

AND

- No other source of infection (i.e., diagnosis of exclusion)

How to Interpret Urine Studies in a Patient With a Foley or AMS

Alternate Diagnosis Likely?
(Signs/ sx of other illness present)

Yes
Do not order U/A, urine cx

No
Send U/A, urine cx

U/A, urine cx (-)
Do not treat for UTI

U/A (-), urine cx (+)
Asymptomatic bacteriuria

U/A (+), urine cx (-)
Treatment for UTI (If no alternate dx identified)

U/A (+), urine cx (+)
Do not treat

Slide courtesy of Catherine Liu.

ASB vs. UTI: Take-Home Points

- ASB is common, especially in catheterized patients
- Pyuria ≠ UTI, but its absence points to a different source
- ASB does not require therapy except for:
  - Pregnancy
  - Urologic procedures
  - Neutropenia, renal transplant <3 mo?
- To diagnose a UTI in a patient with a catheter or who cannot report symptoms, the patient must have:
  - Signs and symptoms compatible with UTI
  - No other source for infection (i.e., diagnosis of exclusion)

Curbside #3

31 y/o woman with SLE on plaquenil and low dose prednisone who traveled to Miami in July (4 months ago) developed a rash and “eye inflammation” a few days after returning. She is now admitted with a lupus flare and asks about possible prior Zika exposure. She is interested in getting pregnant. Should she get serologic testing? Should she delay pregnancy?

The Best Approach to Zika Testing for Her:

1. Check Zika RT-PCR in serum
2. Check Zika RT-PCR in urine
3. Check Zika IgM in serum
4. No testing
After Her Illness, She Should Delay Pregnancy For:

1. 8 weeks
2. 3 months
3. 6 months
4. 1 year

Zika Virus Primer

- Current landscape of cases in the US
- Basics of clinical presentation and transmission
- Zika in Pregnancy
- Zika Testing

Caveats:
- These are the current CDC recommendations as of October 9, 2016
- Check CDC or local DPH websites for updated/local guidance

Zika: Brief Timeline

First identified in monkeys in the Zika forest in Uganda

- 1947

Outbreaks in the Pacific Islands

- 2007-2014

March: Outbreak in Brazil, spread to other parts of Americas

- 2015

Dec: 3rd locally acquired cases in Puerto Rico

- 2016

July: 1st locally acquired cases in Florida

WHO: The History of Zika Virus, 2016

Areas of the World with Active Zika Transmission

CDC: Areas with Zika, October 6, 2016
**Zika Cases in the United States**

- 3,712 travel-associated cases (all states except Alaska)
- 105 locally acquired cases (all in Florida)

CDC, Areas with Zika, October 6, 2016.

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**Zika in Florida**

- CDC, Areas with Zika, October 6, 2016.

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**Zika: Clinical**

- 80% asymptomatic
- Symptomatic disease usually mild and self-limited:
  - Maculopapular (pruritic) rash – 90%
  - Fever (low grade) – 65%
  - Arthritis/arthralgia – 65%
  - Nonpurulent Conjunctivitis – 55%
  - Myalgia – 50%
  - Headache – 45%
  - Severe disease, hospitalization, death all rare
- Main complications are microcephaly and Guillain-Barré syndrome


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**Zika: Mosquito Transmission**

- *Aedes aegypti, Aedes albopictus*
- Aggressive daytime biters, although can also bite at night
- Range in the US > areas that can sustain limited transmission

CDC, Mosquito Control, Potential Ranges in the US, August 2, 2016.
Zika: Sexual Transmission

- Most cases are from men (usually symptomatic but can be asymptomatic) to their sex partners
- Of 3,818 cases in the US, 30 transmitted sexually
- To prevent sexual transmission after possible Zika exposure, use condoms/abstinence for:
  - Men: 6 months after illness onset/return from travel
  - Women: 8 weeks after illness onset/return from travel
  - Irrespective of symptom status*


Zika and Blood Transfusion

- Low risk to the continental US blood supply
- Cases of probable transmission by blood transfusion
- Asymptomatic viremia in blood donors in prior outbreaks and in Puerto Rico 2016
- CDC now recommends screening of all donations for Zika

CDC, Zika and Blood Transfusion, August 31, 2016.

Zika in Pregnancy

- In utero transmission
  - Unclear overall risk, risk by trimester, risk if symptomatic vs asymptomatic
  - Unclear risk of birth defects if fetus is infected

- Association with poor pregnancy outcomes
  - Microcephaly
  - Hydrocephalus
  - Abnormal eye development
  - Growth impairment
  - Hearing loss
  - Pregnancy loss

Of 3,818 cases in the continental US:
  - 837 cases in pregnancy, many ongoing
  - 22 liveborn infants w/birth defects
  - 5 pregnancy losses w/birth defects

CDC, Zika Cases in the US, October 6, 2016.

Zika Advice Regarding Pregnancy

- Pregnant women:
  - Avoid nonessential travel to areas with Zika transmission
  - Use condoms/abstain from sex with a partner returning from a Zika area for the entire pregnancy

- Couples with possible exposure seeking pregnancy
  - Avoid nonessential travel to areas with Zika transmission
  - Test symptomatic patients but not asymptomatic patients with possible exposure
  - Irrespective of symptom status, patients should delay conception for:
    - Men: 6 months after illness onset/return from travel
    - Women: 8 weeks after illness onset/return from travel

Zika Testing for Symptomatic Non-Pregnant Adults

<table>
<thead>
<tr>
<th>Molecular Testing</th>
<th>Serologic Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ RT-PCR of serum and urine</td>
<td>▪ IgM in serum</td>
</tr>
<tr>
<td>▪ Use when &lt;14 days after symptom onset</td>
<td>▪ Use as first test if 2-12 wks after symptom onset</td>
</tr>
<tr>
<td>▪ If positive → Zika confirmed</td>
<td>▪ IgM declines &gt; 12 wks</td>
</tr>
<tr>
<td>▪ If negative → check for IgM</td>
<td>▪ Can cross-react with other flaviviruses so confirm a (+) with plaque-reduction neutralization testing</td>
</tr>
</tbody>
</table>

**Always consider testing for dengue and chikungunya**


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Zika Testing Algorithm for Non-pregnant Adults

![Algorithm Diagram]

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Zika: Take Home Points

▪ Zika is usually asymptomatic, but can present with a mild illness of fever, rash, and conjunctivitis

▪ Zika can be transmitted via mosquitoes, sexual transmission, and blood transfusion

▪ The main complications of Zika are microcephaly and Guillain-Barré syndrome

▪ To avoid sexual transmission, patients should abstain/use condoms for 6 months (for male partner) or 8 weeks (for female partner) after illness/exposure

▪ Test symptomatic non-pregnant adults within 12 weeks of illness onset (PCR if <2 weeks, IgM if 2-12 weeks)

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Curbside #4

23 y/o M with active IVDU admitted with cellulitis and hypotension, found to be bacteremic with 2/2 blood cultures for Group A Streptococcus. He significantly improves after 2 days of vancomycin and cefepime. We are going to narrow him today and he will be ready to go home in a few days. How long should we treat? Do we have to use IV for the whole course?
What Would You Do at Discharge?

1. PCN 3 MU IV q4hr x 14 days
2. Cephalexin 500mg PO qid x 10 days
3. Penicillin VK 500mg PO bid x 21 days
4. Amoxicillin 1gm PO tid x 14 days

**Enterococcal/Streptococcal Bacteremia**

- *Streptococcus pneumoniae*
- Group A, B Streptococcus
- Viridans Streptococcus
- *Enterococcus faecalis*

- No data to guide antibiotic choice/duration except for *S. pneumoniae* bacteremic pneumonia

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**Rx for Strep/Enterococcal Bacteremia**

* Compilation of opinions of 7 UCSF ID consultants.

<table>
<thead>
<tr>
<th>Antibiotic choice</th>
<th>Enterococcus faecalis</th>
<th>Viridans Group Streptococcus</th>
<th>Group A/Group B Strep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>10-14 days</td>
<td>10-14 days</td>
<td>10-14 days</td>
</tr>
</tbody>
</table>

I approach this as a sliding scale based on disease severity:
- More complicated → IV
- Less complicated and/or already got multiple days IV → PO

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**Bacteremic Pneumococcal Pneumonia**

- When ok to switch to oral therapy?
  - When clinically stable (symptoms improving, WBC decreasing, afebrile, able to take PO - most by day 4)
  - No endocarditis or meningitis

- No need to observe in the hospital after IV → PO switch (no difference in 14d readmission rate or 30d mortality)

- Which Abx? (I choose based on disease severity)
  - High dose amoxicillin (1gm PO tid)
  - Levofloxacin 750mg PO daily

- How long?
  - 7-10 days

Strep/Enterococcal Bacteremia: Take-Home Points

- Bacteremic pneumococcal PNA can be treated with short course oral Abx as long as clinically improved
- Otherwise there is no good data to guide choice/duration of antibiotics

Curbside #5

A 75 y/o man with neurogenic bladder and history of prior UTI is admitted with confusion and low-grade fever. His daughter reports the patient had a 2 day history of suprapubic pain and dysuria. UA shows >50 WBC/hpf and urine culture grows E. coli. Blood cultures were negative. He improves on empiric ertapenem and is ready for discharge. Susceptibilities come back and the E. coli is an ESBL producer.

Do I need to send him home on ertapenem or are there any oral options?

Which Oral ABx Has the Best Efficacy in ESBL UTI?

1. Fosfomycin
2. Nitrofurantoin
3. Minocycline
4. Cephalexin

Oral Options for ESBL E. coli in the Urine

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>% Sensitive in vitro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciprofloxacin</td>
<td>4-36</td>
</tr>
<tr>
<td>TMP-SMX</td>
<td>22-43</td>
</tr>
<tr>
<td>Amoxicillin/Clavulanate</td>
<td>11-70</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>58-94</td>
</tr>
<tr>
<td>Fosfomycin</td>
<td>91-100</td>
</tr>
</tbody>
</table>

Caveat: susceptibilities for ESBL Klebsiella are lower for both fosfomycin (~54-80%) and nitrofurantoin (14%)

Clinical Data for Oral ABx in *E. coli* ESBL Cystitis

- **Fosfomycin**
  - Several studies in outpatient cystitis as 1 dose or 3 doses qod → 94% clinical cure
  - Cannot use for pyelo/bacteremia
  - MIC not routinely done in most micro labs
  - Recommend dosing at 3gm PO x 3 doses (or until improvement)

- **Nitrofurantoin**
  - 1 study in outpatient cystitis as 14 day course → 69% clinical cure
  - Cannot use for pyelo/bacteremia
  - Avoid if CrCl<60 due to inadequate urine levels, potential for toxicity

- **Amoxicillin-clavulanate**
  - 1 study in outpatient cystitis given as 5-7d course → 93% clinical cure

What if the Patient has Pyelonephritis?

- Small study in community-acquired pyelonephritis showing non-carbapenem = carbapenem
- But, non-carbapenem group:
  - Mostly aminoglycoside or pip/tazo
  - Had much lower rates of bacteremia
- Bottom line: could consider orals in very select circumstances without bacteremia, but no data

Oral Options for ESBL UTI: Take-Home points

- Most data is for *E. coli* ESBL (limited data for Klebsiella)
- For mild-moderate cystitis:
  - Oral ABx choice dictated by susceptibilities
  - Consider susceptibility testing for fosfomycin if possible
  - Caution with nitrofurantoin given poor clinical cure rates
- Would not use orals if the patient is clinically ill, has bacteremia, or cannot be followed closely
- In very select cases of mild pyelonephritis without bacteremia, could consider orals, but there is no data (and can’t use fosfomycin or nitrofurantoin)

Top ID Curbsides: Take-Home Points

1. Remove lines for complicated infection or *S.aureus, Pseudomonas, Candida*
2. Don’t treat asymptomatic bacteriuria (3 exceptions)
3. To prevent sexual transmission of Zika, patients should abstain or use condoms for 6 months (men) or 8 weeks (women) after illness/exposure

1. Use short course oral therapy for *S. pneumoniae* bacteremia, but no good data for other Strep/Enterococcal bacteremia
2. Consider fosfomycin as an oral option for *E. coli* ESBL UTI
Thanks For Your Attention!

- Questions?