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ANTIBIOTIC STEWARDSHIP ECHO PROGRAM
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CASES POTPOURRI
CASE#1
76 YEAR OLD MALE WITH COPD ADMITTED WITH CAP, INTUBATED IN ICU. STARTED ON ANTIBIOTICS AND FEEDING TUBE PLACED

- Meds: ceftriaxone/ azithromycin/solumedrol
- Day #3- RN reports continuous watery, smelly stool and requests Rectal tube.
- WBC 16,000 . 99.3 F temp
- RN orders C. diff stool test
HOW WOULD YOU INTERPRET THIS C. DIFF TEST?

• C. diff toxin gene PCR – positive
• C. diff ELISA toxin A – negative
• C. diff NAP-1 strain – negative

Would you treat this patient?

What is most likely cause of his diarrhea?
WHAT IF THE PATIENT HAD EITHER OF THESE 2 TEST RESULTS?

• C. diff toxin gene PCR – positive
• C. diff ELISA toxin A – negative
• C. diff NAP-1 strain – positive

• C. diff toxin gene PCR – positive
• C. diff ELISA toxin A – positive
• C. diff NAP-1 strain – negative
C. DIFF LAB
DIAGNOSIS-
REMEMBER IT IS
THE TOXIN
THAT CAUSES
THE SYMPTOMS

- **Direct culture** - not used - $$$ / slow turn around time

- **C. diff PCR** - Is there C. difficile in the stool? 100% sensitive, but **DOES NOT differentiate** between those c.diff that are secreting the toxin and those that are not. Whether or not toxin is being secreted, the PCR test will be positive+

- **ELISA** – Is the C. difficile secreting toxin and causing disease? detects both the presence of C. difficile bacteria (GDH Ag) as well as detects toxin A +/- toxin B.
“DIARRHEA IN THE CRITICALLY ILL IS COMMON, ASSOCIATED WITH POOR OUTCOME, AND RARELY DUE TO CLOSTRIDIUM DIFFICILE”
NIKHIL TIRLAPUR, ET AL.

- 2017 Study in ICU patients with diarrhea found 10% were PCR + for C. diff, only 1% actually were Toxin positive
- “A low yield of stool investigations and low prevalence of Clostridium difficile and norovirus suggest a possible pathogenic role for non-infective processes. Several patients received laxatives and enemas before diarrheal episodes suggesting a need for rational intensivist prescribing.”
CASE#2:
A 68 YEAR OLD WOMAN IS ADMITTED WITH BACK PAIN, VOMITING AND FEVER. THE ER STARTS HER ON SEPSIS PROTOCOL WITH VANCOMYCIN AND PIP/TAZOBACTAM.
URINE AND BLOOD CULTURES GROW KLEBSIELLA.
SHE HAS NO ANTIBIOTIC ALLERGIES.
HOW WOULD YOU MANAGE HER ANTIBIOTICS?
IS CIPROFLOXACIN (MIC <0.25) A BETTER CHOICE THAN CEFTRIAXONE (MIC<1)?

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<table>
<thead>
<tr>
<th>Klebsiella pneumoniae</th>
<th>MIC Dilutn</th>
<th>MIC Interp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>&gt;=32</td>
<td>R</td>
</tr>
<tr>
<td>Ampicillin/Sulbactam</td>
<td>4</td>
<td>S</td>
</tr>
<tr>
<td>Aztreonam</td>
<td>&lt;=1</td>
<td>S</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>&lt;=4</td>
<td>S</td>
</tr>
<tr>
<td>Cefepime</td>
<td>&lt;=1</td>
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</tr>
<tr>
<td>Ceftriaxone</td>
<td>&lt;=1</td>
<td>S</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>&lt;=0.25</td>
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<tr>
<td>ESBL</td>
<td></td>
<td>Neg</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>&lt;=1</td>
<td>S</td>
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<tr>
<td>Meropenem</td>
<td>&lt;=0.25</td>
<td>S</td>
</tr>
<tr>
<td>Piperacillin/Tazobactam</td>
<td>&lt;=4</td>
<td>S</td>
</tr>
<tr>
<td>Trimethoprim/Sulfa</td>
<td>&lt;=20</td>
<td>S</td>
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</tbody>
</table>
WHAT IS A MIC (MINIMUM INHIBITORY CONCENTRATION)?

**MIC:**
It is the lowest concentration of the antimicrobial agent that inhibits the growth of the test organism but not necessarily kills it.

**MBC** *(minimum bactericidal conc.):*
It is the lowest concentration of the antimicrobial agent that kills the test organism.
standardized inoculum of test bacteria

- growth medium + antibiotic
- antibiotic concentration
  - 16
  - 8
  - 4
  - 2
  - 1
  - 0.5
  - 0.25
  - 0.12 mg/l

overnight incubation

read MIC

- subculture to drug-free agar
- overnight incubation

read MBC

MIC of antibiotic = 1 mg/l

MBC of antibiotic = 2 mg/l
REMEMBER JESSICA’S 4 RULES FOR SELECTING AMONG ANTIBIOTTICS

• #1 Always **start with a beta-lactam if possible**

• #2- **DO NOT COMPARE MICs between drugs.** For ex, one drug may have a peak concentration of 200 and be effective with a MIC = 16 while another may have a peak concentration of 3 to 5 and be resistant at a MIC = 1.

• #3- **if <= you can use the drug** – as long as the antibiotic gets into that tissue - for ex: won’t use nitrofurantoin for pyelonephritis, daptomycin for pneumonia, tigecycline in the urine, bacteriostatic drugs for endocarditis

• #4- if you have questions, calling Micro lab can be very helpful

PLUS ONE MORE RULE: **attempt to narrow the spectrum of antibiotic activity once results are available, even if patient doing well**
CASE #3:
82 YEAR OLD WOMAN, WITH HX OF HTN AND AODM, ADMITTED WITH ACUTE RIGHT SIDED CVA.
NO PRIOR COMPLAINTS OR FEVER. NOT ABLE TO SPEAK DUE TO STROKE.

- Labs show WBC- 9500; urinalysis in ER shows 5-10 WBCs, 1+ glucose and leukocyte positive, culture grows >100,000 cfu E.coli, susceptible to all antibiotics including ciprofloxacin and ampicillin.
- On admit, admitting Hospitalist had started Ceftriaxone 1 gram iv daily
- ASP reviews indication for the antibiotic, in-patient Hospitalist states patient has UTI and needs to continue treatment
WHAT WOULD YOU RECOMMEND?

• Complete 7 days of iv ceftriaxone
• Narrow the antibiotic spectrum to Ampicillin iv to complete a 7 day course
• Switch to oral ciprofloxacin to complete a 5 day course of therapy
• Explain to the Hospitalist that there is no role for treating asymptomatic bacteriuria and it puts the patient at high risk for developing C. diff colitis.
INCIDENCE OF ASYMPTOMATIC BACTERIURIA IN THE NON-CATHETERIZED PATIENT

Very Common:

- Young healthy women: 3 to 5%
- Pregnant women: 2 to 9.5%
- Women aged 65-80 years: 18 to 43%
- Women > 80 years: up to 43%
- Men 65-80 years: 2 to 15%
BOTTOM LINE ON ASYMPTOMATIC BACTERIURIA

IF IT AIN’T BROKE, DON’T FIX IT – TREATMENT OF ASB JUST LEADS TO DRUG RESISTANT BACTERIA AND SIDE EFFECTS FROM THE ANTIBIOTIC:

- Antibiotic treatment of ASB does **not** reduce frequency of symptomatic UTI
- Treatment of ASB in diabetes does **not** reduce adverse outcomes, improve glucose control, or reduce symptomatic UTIs
- **It does lead** to untreatable drug resistant bacteria, *C. difficle*, etc
- It does increase risk of developing symptomatic UTIs
- **Only exceptions** are pregnancy where asymptomatic bacteriuria is associated with pyelonephritis, growth retardation, neonatal death… and patients undergoing **urologic procedures** (such as prostate bx)
Figure Legend:
Monthly average number of urine cultures ordered and processed per 100 elective joint arthroplasties before and after implementation of policy to no longer process screening urine cultures. Abbreviations: LCL, lower control limit; UCL, upper control limit.
Screening urine cultures are frequently done prior to joint arthroplasty despite no evidence of clinical benefit, and puts patient at risk for harm- drug reaction, *C. difficile*, resistance.

- Toronto Orthopedic hospital did prospective study where they eliminated preoperative urine cultures and observed for 2 years.
- 1891 cases were done, 3 post-op wound infections – all staph aureus. No urinary pathogens isolated.
- **No role for pre-op cultures** unless patient is symptomatic.