



### Antibiotic stewardship program at MGMC

- National trend/soon a requirement by CMS and Joint Commission. MGMC was early adopter of a “real program” (as opposed to a program in paper, just to fulfill the requirement). Up and running since September 2015. Jill Bode, PharmD (pharmacist); Dr. Fulton (leader)
- Other members: Infectious Disease physicians, Antimicrobial Stewardship Certified Pharmacists, Microbiology, Infection Prevention, IT, Leadership
- MGMC only center in Iowa designated as an Antimicrobial Stewardship Center of Excellence

### Antibiotic stewardship program goals:

- Optimize antibiotic use (right drug, dose, route, & duration)
- Reduce inappropriate or unnecessary antibiotic prescribing
- Reduce antibiotic-associated side effects including C. diff

### Activities

- Prospective review of all Inpatient antibiotic orders (does not affect ER)
- Implementation of more effective diagnostic techniques/allergy screening for infections
- ID service (Dr. Fulton/Dr. Rearigh) for phone consultation weekdays year-round or urgently on weekends.

### Crash course on what you can do to use antibiotics judiciously at MGMC

- Use RESPIRATORY PANEL if you are undecided if the patient has a viral or bacterial respiratory illness:
  - Identifies nearly all relevant viruses and one bacteria (Mycoplasma) that cause respiratory illness
    - (~14) Influenza, Parainfluenza, RSV, Metapneumovirus, etc
    - >95% accurate if nasopharyngeal swab obtained correctly
    - Results available in 1-2 hours since it is PCR-based
    - If virus proven → Less antibiotics will be given for “presumed bacterial infection”
    - Performance >> Respiratory antigen for influenza. Use when high pre-test probability for influenza. We have identified many cases of influenza that were NEGATIVE through traditional testing.
  - Caveats:
    - Ticket price of the test is >\$500. Use judiciously if you suspect the patient will be responsible for charges.
    - Use “ADULT LIMITED RESPIRATORY PANEL” order. It will run a full panel, i.e. “Respiratory panel” “secretly” in the background. Ordering this way saves approximately \$200.
    - **If positive, this does not exclude bacterial pneumonia in addition to the virus identified, but it usually helps lowering down the suspicion of bacterial pneumonia, so the patient can receive no antibiotic or a narrower antibiotic.**
- Rapid Diagnostics Blood Culture Identification Panel (BCID)
  - PCR based. 1 hour turnaround time after culture flagged positive.
  - Allows for early adjustment of antimicrobials to the most appropriate therapy.

- Final pathogen susceptibilities are usually available in 24-72 hours and should always be reviewed to determine if therapy adjustments should be made.
- Urine Culture/UA reflex
  - Accurate urine results begin with obtaining a properly collected urine specimen.
  - The UA Reflex to Microscopy/Culture (as indicated) is the test most commonly ordered; however a urinalysis dipstick only option is available
  - Urine sample results must meet defined threshold criteria for a reflex culture to be automatically added. If these criteria are not met, the provider may order a culture separately. However, is strongly recommended to obtain a **newly collected specimen** in those cases whenever possible.
- Meningitis panel :
  - PCR-based. Test 14 targets in about 1 hour. Most relevant viruses, bacteria and fungus causing meningitis.
  - In the appropriate clinical context (taking in account other parameters of CSF) it may be used to stop antibiotics

### **C. difficile Tests Available at MGMC**

#### **A. C. Diff Complete (LAB103127) – which includes:**

- **C. difficile antigen** = this test detects vegetative C. difficile bacteria but does not detect toxin which is the disease-causing component of CDI. The CDI antigen has a very high negative predictive value (98-99%) for meaningful CDI. A negative antigen test strongly suggests clinically meaningful CDI is absent.
- **C. difficile toxin** = Detection of toxin in the stool is associated with worsened outcomes including increased mortality and morbidity compared to molecular tests (PCR/GIPP) and in the setting of diarrhea is strongly suggestive of CDI and the need for treatment.

- #### **B. C. difficile PCR** = Detected via GI pathogen panel. Molecular assays are exceedingly sensitive and the detection of C. difficile via PCR alone has not been associated with outcomes different than those who test negative for C difficile. Patients with a positive PCR test for CDI will reflexively be tested for the C. difficile antigen and toxin.
- Patients who test negative for both antigen and toxin should be considered to have C. difficile colonization without clinically meaningful CDI and should NOT be treated but should be placed in enteric isolation as they may shed C. difficile spores into the environment.
  - Interpretation of the PCR test should always be made in relation to the antigen and toxin assay (see algorithm below).
  - If a GI Panel is not appropriate for your patient, an indeterminate C. Diff Complete will always follow up with a lab-ordered C. Diff PCR reflex test to ensure we are testing patients with 2 methods as best practice.

## Clostridium difficile Infection (CDI)

C. difficile infection may result in a variety of clinical syndromes ranging from asymptomatic colonization to mild, self-resolving diarrhea, to severe diarrhea and even complications such as toxic megacolon and death. CDI is generally classified as Community-Onset (CO-CDI) or Hospital Onset (HO-CDI). HO-CDI is defined as symptom onset  $\geq 4$  days after admission to a healthcare facility with testing date being the surrogate marker for symptom onset.

General testing recommendations: Do not test all patients with loose or watery stools for CDI

- CDI is responsible for <10% of nosocomial diarrhea
- Consider other causes of diarrhea first (e.g. tube feeds, oral contrast, bowel regimens, antibiotic side effects, etc.) unless symptoms strongly suggest CDI

Patients with mild-moderate nosocomial diarrhea without CDI features should have non-CDI causes treated (stop inciting meds especially laxatives, add fiber to tube feeds, etc.) and be monitored for resolution before CDI testing is considered

- Patients who are admitted with diarrhea should be tested in the first 2 days of their hospital stay
- Never test formed stool, asymptomatic patients, or perform a “test of cure”
- Unformed stool is the only acceptable specimen (i.e., stool conforms to the shape of the container)
- Non-liquid stool will not be processed by the microbiology lab
  - Order only one CDI test and await results before initiating therapy (exception: If severe disease with typical symptoms, reasonable to initiate therapy before results)

PCR/GIP Result	Antigen Result	Toxin Result	Interpretation	Recommendations
Negative	NA	NA	No <i>C. difficile</i> present	No further action. Repeat testing strongly discouraged
Positive	Negative	Negative	<i>C. difficile</i> colonization is present. Very low levels of organism present and unlikely to be cause of symptoms	Treatment not indicated but should remain in isolation
Positive	Positive	Positive	Toxigenic <i>C. difficile</i> infection is present	Begin therapy
Positive	Positive	Negative	<i>C. difficile</i> infection may be present. Negative toxin due to non-functioning toxin gene, low level of <i>C. difficile</i> , or false negative toxin assay	Determine need for treatment based on risk for CDI & clinical presentation; not all patients need treatment. Consider other causes of diarrhea.
Positive	Negative	Positive	Indeterminate	Repeat test

## Penicillin Allergies

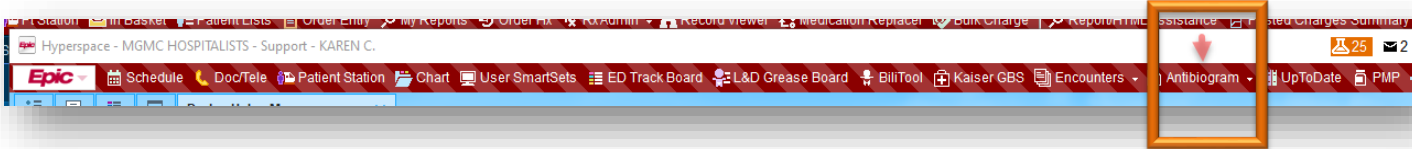
- 10% of general population reports a PCN allergy
- Incidence of anaphylaxis to penicillin is 0.02 to 0.04%
- Approximately 80% of patients with IgE-mediated penicillin allergy lose their sensitivity after 10 years
- Cross-reactivity among beta-lactams is lower than previously reported
  - 3<sup>rd</sup> and 4<sup>th</sup> generation cephalosporins are known to be well tolerated in patients with penicillin allergies
    - Examples: ceftriaxone, cefotaxime, cefepime, cefdinir
  - Cefazolin does not share a side chain with any other beta lactam and is considered safe for patients with a history of anaphylactic penicillin allergy without any additional testing
- The SAFECEF questions help triage patients who can SAFELY get a CEPHalosporin despite claiming a penicillin allergy
  - Was your penicillin allergy hives OR shortness of breath OR throat swelling
  - Was you penicillin allergy < 10 years ago?
  - No to both → OK to get a cephalosporin (type .safecef in the allergy profile to add the following: “Reaction was > 10 years ago and it did not have features of anaphylaxis. Therefore, the risk of allergic reaction to cephalosporin is <1% with a very low risk of anaphylaxis.”
  - Yes to either? Type .unsafecef and you will get “reaction to penicillin was either <10 years ago or had features of anaphylaxis. Therefore, the patient may require penicillin allergy testing before safely receiving cephalosporins.”
  - Provider at MGMC and McFarland are aware of safecef/unsafecef standard wording.
  - For penicillin antibiotics. Do not use wording if patient has a concurrent cephalosporin stated allergy.

## Outpatient Antibiotics (OPAT)

- consult ID

## Antibiogram

- EPIC Header or embedded as a reference when ordering anti-infectives



levofloxacin (LEVAQUIN) 500 mg in dextrose 5% 100 ml IVPB premix

Order Inst.: DOSAGE ADJUSTMENT FOR RENAL IMPAIRMENT  
Creatinine Clearance > 50 ml/min: Normal Dose  
Creatinine Clearance 20 to 49 ml/min: 250 mg every 24 hours  
Creatinine Clearance 10 to 19 ml/min: 250 mg every 48 hours  
HEMODIALYSIS/CAPD: 250 - 500 mg every 48 hours  
COMPLICATED UTI / ACUTE PYELONEPHRITIS:  
Creatinine Clearance >= 20 ml/min: No dosage adjustment required  
Creatinine Clearance 10 to 19 ml/min: 250 mg every 48 hours

Reference Link: 1. Antibiogram: Non-Urine Isolates 2. Antibiogram: Urine Isolates 3. Drug information