AHCA/NCAL Clinical Scenarios

Lab Testing for Infections

Scenario 1

Mrs. Leopold is a 97-year-old resident of Sunny Acres Health Care Center. She is dependent on staff for her mobility due to advanced rheumatoid arthritis. She is cognitively alert and oriented to time, place, person and situation. She is continent of bowel and bladder, although she does need staff assist to use the bathroom. The nursing assistants have reported that for about the last 3 days her morning urine has been very dark and foul smelling. The nurse assesses her and finds there is no urgency, frequency, pain, incontinence or fever. But she is not acting the same and seems a bit more confused. Mrs. Leopold tells the nurse that she is probably not drinking enough fluids, as she has a difficult time holding the glass with her arthritis. The nurse places a call to the provider to ask for a ua/uc, due to the foul-smelling urine and slight change in her mental status. The laboratory that the specimen was sent to has started performing the polymerase chain reaction (PCR) test for all urine analyses and cultures.

1. Older adults with foul-smelling urine and non-specific symptoms such a change in behavior should have a urine analysis and culture to rule out UTI.

a. True

b. False

Foul smelling and dark urine are common features in many different scenarios and have NOT been shown to be related to urinary tract infections (UTIs). Similarly slight changes in mental status are associated with numerous causes but have NOT been found associated with UTIs. Therefore, it's important to conduct a complete assessment to determine if there is the potential for an infection. While urinary tract infections are one of the most common healthcare-associated infections in long-term care facilities (LTCF), they frequently are over diagnosed resulting in overprescribing of antibiotics. Given the high prevalence of asymptomatic bacteriuria in LTCF residents 20-50%, obtaining urine analysis and culture without symptoms found to be associated with UTI, can lead to incorrectly diagnosing UTI, starting antibiotics incorrectly which has risks but worse, misses diagnosing and treating the real cause of the resident's changes. In this situation, dehydration from decreased input is the most likely explanation of the change in urine and mental status. Using evidence-based criteria prospectively such as the Loeb criteria for UTI to evaluate if a resident's symptoms are consistent with a UTI can help avoid over testing, over diagnosing and over treating UTI (see Reducing unnecessary urine culture testing in residents of long term care facilities).

Once the results of the urine analysis are back from the lab, the IP notices that the appearance was slightly hazy, the color amber and Leukocyte esterase and nitrite are negative. WBCs are negative and there are trace amounts of RBCs. The urine culture comes back with gram negative bacteria presumed to be E. coli.

2. How should she interpret the results? (check all that apply)

a. Diagnosis UTI and call the physician for antibiotics

b. Possible contamination

c. Asymptomatic Bacteriuria

d. Inconclusive results and order repeat test

The diagnosis of UTI is not based on urine tests alone but must be made in conjunction with clinical symptoms and findings. Contamination is always a possibility with urine cultures, particularly clean catch urines. Asymptomatic bacteriuria, the culturing of bacteria in the urine without clinical signs of an infection, is common among older women, particularly those in LTC, which upward of 20 to 50% having positive cultures but no symptoms. This is why CMS and CDC recommend using evidence-based criteria to diagnosis UTI such as Loeb or McGeer Criteria. Since obtaining a urine culture was not recommended in this situation, repeating the test would be an incorrect answer.

3. The PCR has detected three different organisms and recommends the use of two broad spectrum antibiotics. The provider should:

a. Order the recommended antibiotics

b. Order the use of one of the antibiotics

c. Encourage staff to hydrate and not order an antibiotic

d. None of the above

The PCR is a molecular laboratory technique that amplifies and detects DNA sequences in specimens for microorganism identification. Multiplex PCR techniques allow multiple pathogens to be detected at once. PCR has a high sensitivity and rapid turnaround time for bacteria. Sensitivity is reported as high as 100% for bacteria and 96% for specificity for presence of any bacteria but the presence of bacteria may not correlate with infection. The presence of bacteria in the urine does not mean a person has an infection. The results are often available in 24 hours, compared to 72 hours for a urine culture. However, PCR testing has not been incorporated into current guidelines for the management of UTI's. Although molecular testing promises the possibility of faster and more sensitive results for those suspected of having UTIs, PCR results must be interpreted with the clinical symptoms, and as such, the current

body of knowledge regarding these tests is not supported by a Diagnostic Stewardship. In all events, the physical signs and symptoms of a UTI must be present for it to be considered an infection versus Asymptomatic Bacteriuria. Therefore, the correct answer would be C.

Scenario 2

Mrs. Thompson, an 82-year-old resident at Sunnyvale Nursing Home, has experienced two loose stools over the past 24 hours with no apparent cause. She exhibits no fever, abdominal pain, or cramping. She has not had a change in medication nor been hospitalized recently. Concerned about a potential *Clostridioides difficile* infection (CDI), a nurse called the on-call provider who orders a nucleic acid amplification test (NAAT) for *C. difficile*. The laboratory reports a positive NAAT result, leading the primary care provider to prescribe oral vancomycin and initiate contact precautions.

4. Was the *C. difficile* test ordered appropriately?

a. Yes, because the resident had loose stools

b. No, because she did not have ≥3 unformed stools in 24 hours or other CDI symptoms

c. Yes, because NAAT is the most sensitive test available

d. No, because stool testing should not be performed for mild diarrhea without further assessment

No, because she did not have ≥3 unformed stools in 24 hours or other CDI symptoms

Explanation: Testing for infections is most helpful in determining an infection when the person has symptoms that are consistent with an infection or meets evidence-based criteria for either testing or the possible infection. Testing in general and for CDI in particular when symptoms are not present is unhelpful and often adds confusion resulting in overdiagnosis. In most circumstances, if tests are positive in the absence of clinical symptoms, they are most likely false positives, which applies to CDI testing as well. Many of the newer tests that rely on detecting genetic fragments (such as Nucleic Acid Amplification Test or NAAT) also can lead to overdiagnosis of infections. Detecting genetic fragments does NOT confirm an active infection, only the presence of the pathogen. Also, it does not indicate the amount of pathogen nor distinguish from colonization or active infection. Test results need to be interpreted in the context of the constellation of symptoms and other potential causes for the symptoms. For example, medication changes including laxatives or antibiotic associated diarrhea as well as other causes such as dietary changes or impaction can all cause diarrheas. The presence of the *C. difficile* gene via a NAAT cannot differentiate between colonization and active infection.

Testing should be reserved for residents with ≥3 unformed stools in 24 hours and additional CDI symptoms. Because NAAT is so sensitive to detecting *C. difficile* presence but not as sensitive at detecting *C. difficile* infection, some recommend using the test in combination with tests for the *C. difficile* antigen or toxin, though those tests have lower sensitivity making the interpretation of testing for *C. difficile* challenging and best done in combination with symptoms.

5. While waiting for test results to return, you should do the following (check all that apply)

a. Place the person in contact isolation

b. Start treatment with either flagyl or vancomycin

c. Place sign on door indicating contact precautions

d. Do nothing until the diagnosis is confirmed

When you suspect a person may have an infection that can easily spread to others such that you order tests or culture, you need to implement infection control measures assuming they may have an infection, otherwise they may spread the infection to others while you wait for the test results. You may not need to initiate treatment while waiting for lab results; treatment decisions before lab results become available should be based on clinical symptoms and judgement. Ideally you should use evidence based clinical algorithms to guide the initiation of treatments such as the Loeb criteria that do not rely on lab results. However, doing nothing is not the correct answer, as you need to put in place infection control measures until the diagnosis is confirmed or ruled out.

Key Takeaways for LTCFs

- Testing decisions should be based on clinical symptoms based on evidence-based algorithms or criteria such as Loeb of McGeer.
- Interpreting test results needs to be in context of symptoms and other causes of symptoms need to be considered.
- Molecular testing is extremely sensitive to detecting genetic fragments of the potential pathogen but does not determine a person has an infection.
- Place residents in appropriate precautions while test results are pending.

Resources

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