Are We Over-treating Asymptomatic Bacteriuria in Pregnancy?: A Quality Improvement Project to Improve Evidence Based Empiric Treatment and Prevention of MDR Organisms

Obstetrics & Gynecology

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Introduction:

Asymptomatic bacteriuria (ABU) occurs in two to 10 percent of pregnancies. A screening urine culture is recommended at the first prenatal visit. Gold standard for diagnosis is the absence of symptoms plus two consecutive voided urine specimens with isolation of the same bacterial strain in quantitative counts of ≥100,000 colony-forming units (cfu)/mL or a single catheterized urine specimen with one bacterial species isolated in a quantitative count of ≥1000 cfu/mL. ABU in pregnancy increases the risk higher order urinary tract infections including pyelonephritis. Without treatment, 20-35% of women with ABU in pregnancy will develop a symptomatic UTI. UTI in pregnancy is associated with increased risk for preterm birth, fetal growth restriction, and increased perinatal mortality. This increased risk for adverse pregnancy outcome is thus the rationale for treatment.

Detecting ABU and UTI via urinalysis/dipstick is generally regarded as a poor test. Dipstick looks for the presence of leukocyte esterase (LE), nitrites, and blood. The overall false negative rate is approximately 53 percent. While the sensitivity and specificity of LE + nitrites together has been shown to be the most sensitive factors, treatment threshold based on other urine dipstick parameter results is often provider dependent. With many providers choosing to treat urine dipsticks with positive LE alone, positive nitrite alone, etc. This lack of unified dipstick diagnostic criteria fosters an overtreatment mentality and begets subsequent bacterial resistance.

In a time where antibiotic resistance is a foremost concern in global medicine, this project seeks to identify if our institution is over-treating obstetrical patients for asymptomatic bacteriuria based on inadequate diagnostic criteria.

Material and Methods:

The data was gathered from the Oklahoma State Medical Center Obstetrics and Gynecology Department from October 2017 until March of 2019. Urine culture positive results were obtained and were compared with urinalysis from the same date of collection. This yielded a total of 739 patients. The data was categorized into the following columns:

- Ob Vs. Gyn Patients
- Patients who had Symptoms that included dysuria, hematuria, frequency, or urgency
- Culture positive or negative
- Organism if there was a reflex culture
- Dipstick results including Nitrites, LE, and Blood

From this information, Gynecological patients were removed from the dataset leaving 604 obstetrical patients. These patients were included in a Factorial Logistic Regression where the “culture positive” was the dependent variable with Leukocyte Esterase and Presence of Blood were our independent variables. The data was subsequently analyzed for the false treatment rate calculated as the culture negative specimens that were treated/ the overall number treated.

Results:

Of the data that was reviewed, a urine culture was ordered in 739 encounters. After removal of the gynecologic encounters, 604 obstetric encounters in which a urine culture was ordered remained. Of these, 293 urine cultures demonstrated some microbial growth, 279 cultures showed no growth, and 32 cultures were ordered but were either not obtained or the order was discontinued. Of the 293 urine cultures with any amount of growth, 78 met criteria for treatment. Eight encounters were removed as these patients were symptomatic, leaving a total of 70 encounters meeting criteria specifically for ABU. Overall, 81/604 cultures were treated, 30 of which did not meet treatment criteria. In other words, 37 percent of the treated population received an antibiotic against a uropathogen in the absence of an indications guided by urine culture.

In addition to the findings mentioned above, 39 (55%) of the 70 cultures meeting criteria for ABU were left untreated.

Based on the cultures which showed any amount of growth, the most common uropathogen in this population was mixed urogenital flora. The most common uropathogen among cultures in which treatment was indicated was *E. coli* followed by *lactobacillus spp.* and *group beta streptococcus*.

Discussion:

The results of this quality improvement project show an alarming number of patients received inappropriate treatment. The primary endpoint was not achieved in that 55.5 percent of patient encounters meeting criteria for AUB did not receive treatment when the indication for treatment was present. However, this data shows that 37 percent of patients without diagnostically treatable cultures were in fact treated. A plausible theory for the high rate of overtreatment is the sole use of a urine dipstick to guide management. This is problematic as there are no definitive criteria for the use of urinalysis variables to diagnose and treat ABU. The most common organism isolated was found to be E. Coli, which correlates with historical data regarding UTI in the non-pregnant population.

An initial analysis of the data revealed that there are no significant correlations between leukocyte esterase and blood to a positive culture. Further studies will be required to define specific ranges of appropriate levels of urinalysis variables that may be indicative of a positive urine culture.

Conclusion:

Based on this data set, patients who meet ABU criteria are being undertreated while those with positive findings on dipstick and urine cultures that do not require treatment are being prescribed antibiotics inappropriately. The use of urine dipstick alone without reflex cultures leads to an increased incidence of over-treatment of asymptomatic bacteriuria in pregnancy. In order to prevent over-treatment and reduce impact on antibiotic resistance, future clinical practices based on these results will be altered so that UA dipsticks positive for leukocyte esterase and/or blood along with clinical suspicion for ABU should have a reflex urine culture prior to treatment. Patients with urine cultures which indicate treatment will be prescribed appropriate antibiotics in order to prevent adverse outcomes in pregnancy.

References:

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