Investigating and Addressing Deficiencies in our Current Urinalysis Reflex Program

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Background

• Literature demonstrates that an effective reflex urine culture program decreases unnecessary urine cultures, reduces associated hospital costs, and prevents unnecessary antibiotic initiation or continuation1.
• There are studied interventions to address these consequences such as: validated thresholds on urinalysis results, urine culture containers that preserve initial urine samples prior to antibiotics, and pharmacy review of culture results to discontinue antibiotics appropriately 1-3.
• Currently our hospital system’s reflex urine culture program does not faithfully progress as expected. There are routinely mistakes in initial urine sample collection which requires substantial action to ensure additional urine samples are sent for culture, which may or may not be prior to antibiotic initiation.
• This often leads to increased provider task burden, samples being sent after antibiotics are administered, or a urine culture not being started at all.
• The breakdown in this protocol leads to increased use of broad spectrum antibiotics and increased hospital length of stays for patients who otherwise could transition to narrowed oral antibiotics on discharge.

Objective

• Identify and address barriers within nursing staff, laboratory personnel, or Epic protocols to streamline a process to appropriately reflex a positive urinalysis to culture.
• Decrease administrative burden on providers that attempt to ensure samples are collected for culture prior to antibiotic administration.
• Decrease hospital length of stay by ensuring appropriate narrowing to microbe-sensitive antibiotics in a timely manner to align with antibiotic stewardship.

Methods

• Quality Improvement Project
• Reviewed urinalysis reflex to urine culture inpatient data from 1/24/2 to 2/26/24 to identify different inferences such as: the amount of urine samples meeting current criteria for reflex but failing to reflex in the system, encounters that had a separate urine culture ordered within 48 hours from the original reflex order, and the amount of urine samples that would satisfy previously studied criteria for reflex.
• Interviewed and shadowed nursing and laboratory personnel to identify the current process of our reflex urine collection protocol, laboratory methods, and culture reflex criteria parameters.
• We plan to examine protocol success rates for post-interventions with associated length of stay and collective antibiotic days to assess improvement.

Results

• From discussion and investigation within the laboratory, the reflex order requires two separate initial samples to be sent in specific tubes: one in a yellow top tube for urinalysis and the other in a gray top tube that has preservative in the base.
• Lab personnel note that a major breakdown in the process is due to obtaining only the yellow top tube or inappropriately labeled tubes without lab specific barcodes.
• The lab cannot connect a sample to an order without these labels or run the samples, so they go into a “catch all” box that is routinely forgotten.
• The criteria for our lab to reflex to urine culture relies on a single parameter of ≥10 WBCs which has a high NPV of 97% but a low PPV of 32.2%4,5.
• Lab personnel also report that if a urinalysis meets criteria for reflex, a label will automatically print in microbiology to prompt technicians to start the culture process on the gray top tube, if provided.
• After discussing the process with the emergency department nursing staff, they noted the different urine sample tubes and their utility. However, this was not seen inseasoned nursing and less experienced nursing staff in the emergency department or the med/surg floor may not be aware of this crucial component.
• Of the data obtained, we reviewed a total of 9,483 encounters and excluded 4,081 encounters due to cultures being collected prior to urinalysis leading to an applicable 5,404 encounters for further review.
• 452 samples met current lab criteria (≥10 WBC) but did not reflex to a urine culture.
• There were 0 samples in the data provided that reflexed to a urine culture as intended in the reflex order, leading to a separate order having to be placed for a urine culture.
• There were 3,683 total encounters without a separate urine culture order being placed.
• 83 samples had ≥ 5 WBC and were nitrile positive
• 338 urinalysis samples had ≥ 5 WBC and also 2+/3+ leukocyte esterase
• There were 953 instances of a separate urine culture being ordered within 48 hours of the urinalysis reflex being ordered.
• 425 of these being ordered within 1 hour of the urinalysis reflex order being placed.
• Many of these were also placed prior to receiving the urinalysis results.
• Of the urine cultures ordered, 501 samples had either no growth or grew normal urogenital flora. 404 urine cultures ordered within 48 hours showed growth of an organism at varying CFUs less than 100,000 CFU.
• It is unknown if antibiotic administration had a role in urine culture results based on the data obtained.

Discussion

• Our review of our data has shown many breakdowns in the current urine culture reflex process.
• There is evidence that even under the current hospital criteria for reflex, the order is not properly reflexing to start a urine culture.
• Notably, no urinalysis successfully reflexed in the time frame observed.
• In addition, clinicians inevitably ordered a separate urine culture order within 48 hours due to this failure in reflex or, in some cases, with presumptive failure (many within 1 hour).
• There are limitations to the data we have reviewed:
• It is not known how the urine was collected or patient voiding status from the data set (voided spontaneously, clean catch, in/out catheter, versus chronic indwelling catheter).
• It is unknown if there was antibiotic exposure and its effects on urinalysis or culture as detailed in the results section.
• Future considerations: Collaboration with pharmacy in creation of a formalized review program of urine culture data and antibiotic recommendations. In various studies, pharmacy review programs decrease 29-31% of inappropriate antibiotic use5,6.

Conclusion

• It is our recommendation that a hospital-wide nursing education be implemented to ensure proper collection of urine samples prior to antibiotic administration when clinically indicated.
• We also recommend the criteria for reflex to be changed to include three arms:
  • WBC’s ≥ 5 and positive nitrites
  • WBC’s ≥ 5 and 2+/3+ leukocyte esterase
  • WBC’s ≥ 10

References

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