Improved Sensitivity for Detection of Urinary Tract Infections Using Novel Light Scattering Methodology

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Background

• Urinary tract infection (UTI) is common, and urine culture is one of the highest volume tests performed in clinical microbiology laboratories

• There is overutilization of urine culture due to suboptimal screening technology:
  - Monopolizes laboratory resources
  - As patients await results, there is unnecessary exposure to antibiotics
    - Promotes bacterial antimicrobial resistance
    - Increases risk for Clostridium difficile infection
    - Adverse side effects of antibiotic medication
  - A common approach is to screen samples using urinalysis (UA) to determine those that should proceed to culture

• The objective of this study is to compare a novel UTI detection method (BacterioScan 216Dx UTI System) to urinalysis for screening urine samples for reflex to culture

• Secondary objectives:
  - Evaluate effectiveness of crystal violet to select for Gram negative organisms
  - Determine if a higher dilution decreases the false positive rate without notably sacrificing sensitivity

Methods

• Urine samples (n=194) were evaluated by UA, culture and BacterioScan 216Dx UTI System to detect the presence/absence of UTI pathogens
  - 2 urine dilutions (1:8 and 1:200) were prepared in Tryptic Soy Broth (TSB) with and without 2 ug/mL of crystal violet followed by 190 minutes of optical assessment
  - UTI detection was defined as growth in culture of one or two uropathogens at densities of ≥10,000 CFU/mL
  - Reflex parameters for culture were compared to results from 216Dx to evaluate sensitivity and specificity

• BacterioScan method is more sensitive and specific for the identification of uropathogens than UA

• Screening patients for UTI requires a HIGH SENSITIVITY so a UTI is not missed and treatment is not delayed

• Screening with BacterioScan did not miss a UTI in our study (ZERO FALSE NEGATIVES)

• Screening with UA missed 4 individuals confirmed to have UTI by culture (4 FALSE NEGATIVES)

• BacterioScan identified a greater number of urines truly negative for presence of uropathogens (69.07% vs 60.82%)

• Screening with BacterioScan would further reduce unnecessary culture by 9% over UA.

• Crystal violet could select for Gram negative isolates, but lead to an increase in the false negative rate.

• Increasing the inoculation dilution factor decreased the false positive rate by approximately half but decreased the sensitivity (1:8 No CV vs 1:200 No CV)

Conclusion

In this study, the BacterioScan System proved to be a MORE EFFECTIVE METHOD OF SCREENING FOR URINARY TRACT INFECTIONS than traditional urinalysis.