

## Background

- Pediatric urinary tract infection (UTI) is a relatively common diagnosis. However, culture data can take up to 48 hours to result, delaying diagnosis and exposing pediatric patients to broad spectrum antibiotics unnecessarily.
- Sensitivity of screening urinalysis can be low, since the screen can greatly depend on the quality of how the sample was obtained. Therefore, rapid screening for bacteriuria by other means would be beneficial.
- Narrow Angle Forward Laser Scattering Technology (NAFLST) with Bacterioscan has been used to promptly identify bacterial growth in a liquid samples.



- Through this technique, a laser beam is shone through a liquid sample containing replicating bacteria in nutrient broth.
- Over time as bacteria replicate in the media, the laser beam light is refracted and scattered.
- Higher degrees of light refraction represent higher initial bacterial load and continued bacterial growth.
- The degree of optical scatter is graphed over time by the machine, allowing Bacterioscan to identify which samples are "Likely Positive" or "Likely Negative" in approximately 3 hours.
- Through this technique, NAFLST has been used to screen urine cultures as "likely positive" or "likely negative", thus avoiding unnecessary antibiotic use and unnecessary culture plating on agar dishes.





# **Rapid Detection of Pediatric Bacteriuria Using** Narrow Angle Forward Laser Scattering Technology (NAFLST) with Bacterioscan A. Cline MD, K. Levinson PhD, MPH, R. Jhaveri MD, FIDSA, FPIDS, M. Miller PhD, D(ABMM), F(AAM) **University of North Carolina Health Care**

| * | This protocol was reviewed and approved by the UNC Biomedical Institutional Review Board.   | • |
|---|---|---|
| • | 169 pediatric (<18 yo) urine samples were tested at UNC Health Care from 1/11/2017-2/17/17. | • |
| • | All urine samples were <24 hours old, refrigerated,   |   |

were collected in sterile cups vs a chemically preserved test tube, and were obtained either via clean catch, suprapubic catheterization, or urethral catheterization.





|             | Trial 1:<br>NAFLST Identificati<br>Any Urine Culture<br>Growth |
|-------------|--|
| Sensitivity | 70.8%  |
| Specificity | 75.3%  |
| PPV         | 79.0%  |
|             |  |

#### Methods

- Over a 3 hour period, NAFLST graphed the degree of light scatter through each urine specimen.
- The machine generated a report that classified each sample as either "Likely Positive" or "Likely Negative" based on the degree of light refraction and its resultant graph, generated by bacterial replication.
- These results were compared with urine culture results, obtained via routine microbiologic methods.

#### Results



### Results

- There were 169 pediatric urine cultures sampled. 76% were female; 24% were male samples. Age ranged from 9 days-18 years old. Majority of samples were obtained by clean catch (62%), followed by urethral catheterization (25%), collection method not listed (12%), and suprapubic (1%). 92% of samples were stored in sterile cups without chemical preservative; 8% were stored in chemically preserved vials.
- Two analyses were conducted. The first analysis examined any urine culture growth on agar plates (regardless of its clinical significance) and NAFLST's ability to correctly identify the sample as