Background: Conventional phenotyping requires large numbers of bacteria, which is impractical for direct detection of antimicrobial resistance in a clinical specimen. The purpose of our study was to determine the sensitivity, specificity, and speed of automated microscopy for success is indirectly related to the time required to administer antimicrobial therapy and growing in complexity. For critically ill patients, the likelihood of survival increases 2-fold for every 1-hour delay in appropriate antibiotic therapy. Sensitivity and specificity were, respectively, 93% [CI 82%-98%] and 96% [CI 87%-99%]. The system correctly classified 51 of 53 ESBL-positive and 70 of 73 ESBL-negative isolates, using a growth inhibition criterion. Results were compared to CLSI confirmatory disk diffusion (DD) ESBL classification criterion. The set of known ESBL-positive isolates included CLSI ESBL QC strains, and the set of known ESBL-negative isolates included CLSI ESBL QC strains.

MATERIALS & METHODS

Colonies from agar plates were resuspended in broth and grown for 2 hours in tryptic soy broth. Log phase cells were resuspended in 200 µL of 3.6 to >200. The system classified isolates as ESBL-positive if the mass ratio exceeded a threshold criterion. Results were compared to CLSI confirmatory disk diffusion (DD) ESBL classification criterion. The system correctly classified 51 of 53 ESBL-positive and 70 of 73 ESBL-negative isolates, using a growth inhibition criterion. Results were compared to CLSI confirmatory disk diffusion (DD) ESBL classification criterion.

The system performed 6 concurrent assays in separate flowcells for each isolate, using two 3rd-generation cephalosporins (3GCs) plus a confirmatory enzyme inhibitor, in duplicate. Assay kinetics enabled sensitive, specific, and rapid detection of the ESBL phenotype using a single challenge concentration of each antibiotic. The analytical speed of the automated system was consistent with the rapid analysis time and improve test performance. Any kinetic analysis enabled sensitive, specific, and rapid detection of the ESBL phenotype using a single challenge concentration of each antibiotic. The analytical speed of the automated system was consistent with the rapid analysis time and improve test performance.