University of Texas Health Science Center at Houston

Rapid, Point-of-Care Detection of Extended-Spectrum β-lactamase-Producing Enterobacteriaceae Directly From Clinical Samples

Extended-Spectrum β-lactamase-(ESBL) Producing *Enterobacteriaceae* are considered a serious public health threat in the US and the rest of the world (1). The Centers for Disease Control and Infection (CDC) conservatively estimates that ESBL-producing *Enterobacteriaceae* (ESBL-PE) are associated with 26,000 healthcare-associated infections and 1,700 deaths per year in the US alone (2). Additionally, infections caused by these ESBL-PE have been documented in the community, in patients with no important exposure to the healthcare and are of major concern in animal husbandry, suggesting that these organisms can be readily transmitted through the food chain (1). The presence of ESBL precludes the use of broad-spectrum cephalosporins, making carbapenems the drug of choice for these infections. Thus, the increased prevalence of these organisms have stimulated the empiric use of carbapenems as empiric therapy where ESBL-EP are suspected, favoring selection of carbapenem-resistant *Enterobacteriaceae,* an urgent public health-threat according to the CDC (2). Thus, rapid detection of ESBL-PE is of paramount importance to target therapy and decrease the use of carbapenems, two important goals for antibiotic stewardship. Indeed, implementation of strategies for antibiotic stewardship are now required by the Federal government in hospitals across the USA. Current techniques for detecting ESBL-PE include phenotypic tests (to detect the presence of the enzyme) or the genes encoding such enzymes. Both current approaches are time-consuming (24-48 h) since they usually require the isolation or growth of the organism before the test is performed. **The Rapid ESBL** test is a colorimetric biochemical assay that is based on the detection of a pH change in the solution as a consequence of the hydrolysis of cefotaxime (a cephalosporin) by an ESBL enzyme. The presence of the enzyme is confirmed by adding tazobactam (a β-lactamase inhibitor) in a parallel reaction. The test can be performed directly from blood and urines leading to results in ca. 30 minutes and is likely to have an average cost of less than $5. We envisage that the Rapid ESBL test can be applied as a point-of -care test initially to patients with bacteremia and urinary tract infections (both health-care and community associated) and can become an important tool to target therapy and for antibiotic stewardship efforts in order to preserve carbapenems as key “last-resort” antibiotics.