Epidemiology, Risk Factors, and Outcomes of a Novel Piperacillin/Tazobactam-Non-Susceptible, β-lactam-Pan-Susceptible (TZP/NS/BL-PS) Phenotype in Enterobacteriaceae

INTRODUCTION
Antimicrobial resistance among Gram-negative bacteria, particularly Enterobacteriaceae, has become a global threat (1). Piperacillin/tazobactam (TZP) is a potent broad spectrum antibiotic commonly initiated as empiric therapy to treat infections presumed to be caused by antimicrobial resistant organisms (2). The susceptibility minimum inhibitory concentration (MIC) breakpoint of TZP against Enterobacteriaceae is ≤16 μg/mL (3). A recent surveillance study (4) in 35 hospitals across the US by our group identified a novel phenotypic profile among Escherichia coli and Klebsiella pneumoniae comprised of TZP MICs >32 μg/mL (i.e., non-susceptible by EUCAST criterion) while maintaining susceptibility to most other β-lactams, TZP, and Meropenem (4). This phenotype was observed within approximately 5% of the Enterobacteriaceae isolates at our center (4). TZP susceptibility results are often cascaded and selectively reported (4) if (a) the susceptibility results are not available for all tested antibiotics. Laboratories should reconsider susceptibility reporting until more data regarding TZP outcomes for such organisms become available.

OBJECTIVES
To determine the frequency of TZP/NS/BL-PS Enterobacteriaceae isolates over a 4-year period at Hartford Hospital
To describe characteristics of patients harboring TZP/NS/BL-PS Enterobacteriaceae at Hartford Hospital and the presence of established risk factors for antibiotic resistance
To determine the impact of infection with TZP/NS/BL-PS Enterobacteriaceae on TZP treatment outcomes compared with TZP susceptible isolates

MATERIALS & METHODS
Study Design
Retrospective, descriptive study to assess the epidemiology, risk factors, and outcomes of Enterobacteriaceae harboring the TZP/NS/BL-PS phenotype at Hartford Hospital
Study population
A chart review was approved by the Institutional Review Board at Hartford Hospital, Hartford, CT, USA.
Patients
The study population was defined as patients admitted to Hartford Hospital between January 2012 and December 2015 with Enterobacteriaceae isolates harboring the TZP/NS/BL-PS phenotype. Patients with the TZP/NS/BL-PS phenotype were identified by the microbiology laboratory.

RESULTS
Patients Demographics and Characteristics
Table 1 lists patients' demographics and characteristics for the 85 admitted patients harboring the TZP/NS/BL-PS phenotype.

Hospital Course and Outcomes of Patients Infected with TZP/NS/BL-PS Organisms
A total of 55 patients showed signs and symptoms of infection presumed to be caused by the TZP/NS/BL-PS phenotype. Table 2 outlines hospital course and outcomes of these patients are presented in Table 2.