Microbial Drug Resistance
Prevalence and Characterization of Multidrug-Resistant and Extended-Spectrum Beta-Lactamase-Producing Escherichia coli from Pediatric Wards of a Malaysian Hospital

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ABSTRACT

The emergence of Escherichia coli resistant to extended-spectrum cephalosporins (ESCs) is of concern as ESC is often used to treat infections by Gram-negative bacteria. One-hundred and ten E. coli strains isolated in 2009–2010 from children warded in a Malaysian tertiary hospital were analyzed for their antibiograms, carriage of extended-spectrum beta-lactamase (ESBL) and AmpC genes, possible inclusion of the beta-lactamase genes on an integron platform, and their genetic relatedness. All E. coli strains were sensitive to carbapenems. About 46% of strains were multidrug resistant (MDR; i.e., resistant to ≥3 antibiotic classes) and almost half (45%) were nonsusceptible to ESCs. Among the MDR strains, high resistance rates were observed for ampicillin (98%), tetracycline (75%), and trimethoprim/sulfamethoxazole (73%). Out of 110 strains, blaTEM-1 (49.1%), blaCTX-M (11.8%), and blaCMY-2 (6.4%) were detected. Twenty-one strains were ESBL producers. CTX-M-15 was the predominant CTX-M variant found and this is the first report of a CTX-M-27-producing E. coli strain from Malaysia. Majority (3.1%) of the strains harbored class 1 integron-encoded integrases with a predominance of adaA and dfr genes within the integron variable region. No gene cassette encoding ESBL genes was found and integrons were not significantly associated with ESBL or non-ESBL producers. Possible clonal expansion was observed for few CTX-M-15-positive strains but the O25-ST131 E. coli clone known to harbor CTX-M-15 was not detected while CMY-2-positive strains were genetically diverse.