Characterization of Carbapenem-Reduced-Susceptible (CRS) *E. coli* (EC) and *K. pneumoniae* (KP) from Canadian Hospitals: CANWARD 2007 and 2008


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**Revised Abstract**

**Background:** The purpose of this study was to characterize CRS EC and KP isolates from Canadian hospitals.

**Methods:** A total of 1282 EC and 171 KP were collected from January 2007 to December 2008. Invasive, as part of the national CANWARD Surveillance Study, assessing antimicrobial resistance in Canadian hospitals. Antimicrobial susceptibility testing was performed using CLSI broth microdilution method. Any EC or KP with an carbapenem MIC of ≥1 µg/ml were defined as CRS and further analyzed. Carbapenemase-production was confirmed by using the Carba NP test. Molecular subtyping was performed by PFGE. Reverse transcriptase polymerase chain reactions (RT-PCR) were used to detect enterobacteria (L12) protein changes. PFGE was used to assess genetic relatedness.

**Results:** A total of 2007 (15.7%) EC and 671 (39.3%) KP were CRS. 25 (2.0%) EC and 66 (10.0%) KP demonstrated a weak positive result using the ME. 40/671 (6.0%) EC were intermediately resistant by ME. All isolates were KPC-2 positive. 173 (68.7%) EC and 85 (12.9%) KP were ESBL producers. Approximately 30% of isolates were Multi-Drug Resistant (MDR: resistance to ≥3 antimicrobial classes) and were determined to be genetically unrelated (≥85% homology). Sensitivity testing for select agents in the literature follow.

**Conclusions:** The majority of CRS EC and KP in Canada are MDR with most being ESBL producers. CF was not detected by PCR or MS. The spread of CRS EC and KP in Canada was found to be polyclonal. The emergence of these isolates demonstrates the need for a more careful use of carbapenems.

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**Materials & Methods**

**Isolates were selected from the Canadian Ward (CANDAR) surveillance study which is a national study based at Health Sciences Centre in Winnipeg.** Case isolates were collected from January 2007 through December 2008. 12 sentinel Canadian hospitals (10 centres in 2008) submitted pathogens from patients attending hospitals. Laboratory methods included antigen detection and antibiotic susceptibility testing. The centre, each isolate was asked to submit pathogen, concomitant therapy (if available) and center of origin of infection (MIC, 2008, 2007, 2006, 2005). All isolates were OmpC and OmpF susceptibility testing by broth microdilution in accordance with CLSI standard and was determined to be genetically unrelated (≥85% homology). Multi-Drug Resistant (MDR: resistance to ≥3 antimicrobial classes) and were determined to be genetically unrelated (≥85% homology). Sensitivity testing for select agents in the literature follow.

**Conclusions:** The majority of CRS EC and KP in Canada are MDR with most being ESBL producers. CF was not detected by PCR or MS. The spread of CRS EC and KP in Canada was found to be polyclonal. The emergence of these isolates demonstrates the need for a more careful use of carbapenems.

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**References**