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United Arab Emirates University

**The College of Graduate Studies and the College of Medicine
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Master Thesis Defense

Entitled

***EMERGENCE OF CARBAPENEM RESISTANT ENTEROBACTERIACEAE IN
ABU DHABI, 2009-2015***

by

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side

Abstract

The rapid emergence of carbapenem resistant Enterobacteriaceae (CRE) is a global phenomenon that has not spared the United Arab Emirates. However, unlike in most Western countries with similarly developed health care system, very little data have been available locally on the rate and dynamics of antimicrobial resistance in general, and that of CRE, in particular. Our laboratory has been collecting CRE isolates from Abu Dhabi hospitals since 2009. In the current study we subjected 394 such independent isolates, representing 34.0% of the total CRE encountered, to a detailed analysis that included the determination of their



antibiotic susceptibility profile, of the type and alleles of the carbapenemases produced, of the pulsotypes and multi locus sequence types of the strains, respectively. 84.0% of the strains produced a carbapenemase. The most common type was OXA-48-like (43.9%) followed by NDM (24.9%). A high rate of double carbapenemase producers (14.5%) was also observed, while no KPC and IMP were encountered. Regarding the specific alleles, OXA-232 and NDM-1 were the most common ones. 16.2% of the strains exhibited non-susceptibility to colistin, while 57.6% to tigecycline, 29.4% exhibited extreme- (XDR), while 5.6% pan-resistance (PDR). Seven major *Klebsiella pneumoniae* clones were identified: ST14 (n=111), CC147 (n=43), ST231 (n=36), CC101 (n=16), ST11 (n=8), ST45 (n=8) and ST15 (n=5), representing 70.1% of all *K. pneumoniae*, and 57.6% of all strains encountered. Representatives of these clones were present in majority of the hospitals. The emergence and spread of these clones considerably impacted the local epidemiology of CRE as, in general, they were more likely to be XDR or PDR than the rest of the collection.

Our data show that Abu Dhabi is facing a severe CRE problem. Only a continuous surveillance supported with molecular typing data, as those generated by the current study, could offer the background to successfully control the problem.

Keywords: carbapenem, Enterobacteriaceae, antibiotic resistance, molecular typing, sequence typing, carbapenemases, OXA-48-like, NDM, IMP, KPC, colistin, XDR, PDR, clones, *Klebsiella pneumoniae*, epidemiology.