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Genetic context of blaKPC in strains encountered in the Arabian Peninsula, a region of low prevalence

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Background: Although carbapenem resistant *Enterobacteriaceae* (CRE) strains are increasingly common in the Arabian Peninsula, KPC-producer isolates have still seldom been identified. In this study we compared the genetic context of bla_{KPC} in KPC-CRE isolates encountered in the Arabian Gulf region.

Material/methods: One thousand four hundred ninety-four CRE isolated in 2012-2016 in Bahrain (n=30), Kuwait (n=119), Oman (n=93), Qatar (n=18), Saudi Arabia (n=240), and in the United Arab Emirates (UAE) (n=994), were screened by bla_{KPC} specific PCR. Species identification and antibiotic susceptibility testing were performed using VITEK 2. Colistin susceptibility was confirmed by microdilution. KPC-positive strains were compared by rep-PCR (Diversilab), macrorestriction analysis

and by MLST. *bla*$_{KPC}$ bearing plasmids were identified and their complete nucleotide sequences were determined using Illumina MiSeq.

Results: Of all CRE tested 7 (0.46%), including the previously reported 2 strains from the UAE, carried *bla*$_{KPC}$, all of which were KPC-2. Details of the strains and plasmids are shown in the Table.

Strain	Country	Species	MLST	Other carbapenemase genes carried	KPC plasmid			
					Inc type	Size (bp)	Mobile genetic element associated with *bla*$_{KPC-2}$	Other resistance genes carried on the KPC plasmid
SA74	Saudi Arabia	*M. morganii*	NA	*bla*$_{IMP}$	IncX6	43330	ΔTn*1722*	*bla*$_{TEM-1B}$
SA114	Saudi Arabia	*K. pneumoniae*	ST38	*bla*$_{NDM}$	IncFIIK	75190	Tn*4401b*	None
KW90	Kuwait	*K. pneumoniae*	CC307	None	IncL/M	104774	Tn*4401b*	*aac(6')-1b-cr, bla*$_{TEM-1B}$*, bla*$_{OXA-1}$*, qnrB66, catB3, tet(A), dfrA14*
KW99	Kuwait	*K. pneumoniae*	CC147	None	IncL/M	90993	Tn*4401b*	*aac(6')-1b-cr, bla*$_{TEM-1B}$*, sul1*
QA18	Qatar	*K. pneumoniae*	ST11	None	IncR-FII	129870	ΔTn*1721*	*rmtB, bla*$_{CTX-M-65}$*, bla*$_{SHV-12}$*, bla*$_{TEM-1B}$*, fosA3*
ABC220	UAE	*K. pneumoniae*	ST14	None	IncX3	46900	Tn*4401b*	None
ABC224	UAE	*K. pneumoniae*	ST14	None	IncX3	46900	Tn*4401b*	None

The *Morganella morganii* isolate was resistant to all antibiotics tested, while the *K. pneumoniae* strains were resistant to all beta-lactams, ciprofloxacin, co-trimoxasole, and variably resistant to aminoglycosides, tigecycline, fosfomycin and colistin, respectively. The *K. pneumoniae* isolates were clonally unrelated to each other and to the previously reported UAE isolates. With the exception of the Qatari strain, they did not belong to the CC258 clone occurring worldwide. The *bla*$_{KPC-2}$ genes were carried on plasmids of various incompatibility types, all have been associated with *bla*$_{KPC}$ genes earlier. The majority of *bla*$_{KPC-2}$ was located on a transposon, Tn*4401b,* shown worldwide to carry this gene.

Conclusions: Our data suggest that the KPC-producing strains, as well as the plasmids carrying *bla*$_{KPC}$ encountered in the Gulf region are unrelated and the international KPC-producer *K. pneumoniae* CC258 clone has not been established in the area, yet. Further studies, requiring close monitoring of the local epidemiology of CRE, should clarify whether this could be an explanation of the rare occurrence of KPC-producer *Enterobacteriaceae* in the Arabian Peninsula.