

Angola as a major source of carbapenem-hydrolyzing β -lactamase OXA-181 in Enterobacteriaceae

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Background: Acquired resistance to carbapenems in Gram negatives nowadays represents a major public health threat. Resistance to carbapenems is mainly due to production of carbapenemases, including the acquired metallo- β -lactamase (MBL) NDM-1 and the carbapenem-hydrolyzing class D β -lactamase OXA-48 that are increasingly identified worldwide, being mostly found in Enterobacteriaceae. No epidemiological data are available regarding the occurrence of carbapenemases in Angola. We therefore initiated a prospective study in order to evaluate the rate of colonization of patients by carbapenemase producers at a Pediatric hospital in Luanda.

Methods: Rectal swabs were collected from children being either inpatients or outpatients during a one-week screening period, May 2015. After a pre-enrichment in broth supplemented with ertapenem 0.25 μ g/ml, samples were screened for the occurrence of carbapenem-resistant enterobacterial isolates using selective agar plates including the Chrom ID Carba SMART (bioMérieux). Then colonies were tested with the Rapidec Carba NP test (bioMérieux) for detection of carbapenemase production. PCR experiments were further performed using primers specific for all carbapenemase genes.

Results: A total of 157 samples were collected from children being 3 months to 13 years-old. A total of 101 carbapenem-resistant Gram negative isolates were recovered, the majority being *Klebsiella pneumoniae* (n=34) and *Escherichia coli* (n=37). A total of 74 carbapenemase producers were identified, including 34 *K. pneumoniae*, 33 *E. coli*, and 4 *Acinetobacter baumannii*. The most common carbapenemase identified was OXA-181 (a derivative of OXA-48) found in 39 *K. pneumoniae*, 29 *E. coli*, and a single *Enterobacter cloacae*. Nine NDM-1-producing isolates were identified, being 4 *E. coli*, 2 *K. pneumoniae*, a single *Providencia stuartii*, a single *Providencia rettgeri*, and a single *A. baumannii*.

Conclusion: This study identified for the first time carbapenemase producers in Angola. Noteworthy, those isolates were recovered from children. There was a significant number of NDM-1 producers, there was a large majority of OXA-181-producing isolates. This is remarkably considering that so far there have been only scattered reports of OXA-181 producers in the world, even though the Indian subcontinent is supposed to be the main reservoir nowadays, as it is for NDM-1 producers. The source of contamination could not be linked to India so far, and therefore remains unknown. According to the very high rate of carbapenemase-producing isolates identified here, it seems that Angola can be now considered as an endemic area.