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Place of Xpert Carba-R v2assay for the detection of carbapenemase producing Enterobacteriaceae in a low prevalence setting

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Background: Early detection of patients colonized with carbapenemase-producing Enterobacteriaceae (CPEs) is detrimental for implementing proper infection control measures. Here, we evaluated the biological performances of the Xpert® Carba-R v2 (Cepheid) in the daily workflow of a hygiene unit, in a country with low CPE prevalence

Materials/methods: Patients repatriated from countries known for high prevalence, or contact patients of a known CPE-carrier were targeted as being "high-risk patients" for CPE carriage. Between September 2015 and November 2016, 449 "high-risk patients" for CPE carriage were screened using the Xpert® Carba-R v2 and by plating on ChromID®CARBA Smart medium (bioMérieux) with and without ertapenem-containing enrichment culture for 24h. Of these patients, 84% were previously hospitalized abroad and 16% were contact patients of known CPE carriers.

Results: The Xpert® Carba-R v2 was able to detect fourteen OXA-48-like, one KPC, one NDM and one OXA-48-like/NDM carriers. For 2 out of the 19 Xpert® Carba-R v2 positive samples cultures remained negative even on two additional screenings (performed at day 4 and 7), but most surprinsingly, one 1 *Citrobacter freundii* OXA-48-producer was not detected by the Xpert® Carba-R v2.

The Xpert® Carba-R v2 yielded 94,44% sensitivity, 99.53% specificity, 89.47% positive predictive value and 99,76% negative predictive value.

Patient	Xpert® Carba-R v2	Cultured CPE	Origin of patients
1	OXA-48 VIM	*K. pneumoniae* OXA-48 *E. cloacae* OXA-48 + NDM-1	Serbia
2	OXA-48	*K. pneumoniae* OXA-181	Algeria
3	OXA-48	*E. coli* OXA-48	France (contact patient of OXA-48 carrier)
4	OXA-48	*E. coli* OXA-48	Tunisia
5	OXA-48	*E. coli* OXA-48	Algeria
6	OXA-48	*K. pneumoniae* OXA-48	Saoudi Arabia
7	KPC	*E. coli* KPC-3	Portugal
8	OXA-48	*E. coli* OXA-48	France (contact patient of OXA-48 carrier)
9	OXA-48	*E. coli* OXA-48	Algeria
10	OXA-48	*E. coli* OXA-181	India
11	OXA-48	*E. coli* OXA-204	France
12	OXA-48	*E. coli* OXA-48	Morocco
13	OXA-48	*E. aerogenes* OXA 48	France (contact patient of OXA-48 carrier)
14	OXA-48	*K. pneumoniae* OXA 48	Tunisia
15	OXA-48	*E, coli* OXA 48	Lebanon
16	NDM	*E.coli* NDM-5	India
17	OXA-48	*E. coli* OXA 48 *E. aerogenes* OXA 48	France (contact patient of OXA-48 carrier)
18	OXA-48	None	France (contact patient of OXA-48 carrier)
19	OXA-48	None	Cambodia

Conclusions : Our study demonstrated that the Xpert® Carba-R v2 kit is well adapted for rapid screening of high-risk patients even in low prevalence regions (in less than 1 hour versus 24/48h for the culture). In the targeted high risk patient population, the prevalence is 4.3%, while in France the prevalence is lower then 1%. This assay may guide infection control programs to limit the spread of CPEs.