Evaluation of a rapid diagnostic test for the detection of OXA-48 carbapenemase.

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BACKGROUND

The increasing incidence of isolates producing OXA-48 carbapenemase in members of *Enterobacteriaceae* family has become a major public health concern.

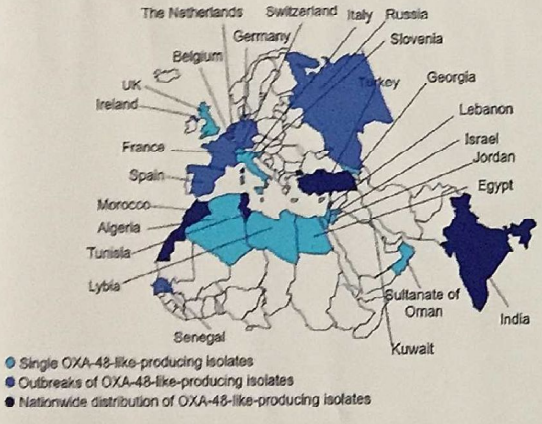

Figure 1. Worldwide spread of OXA-48 producing strains.

Nordmann P. Med Mal Infect. 2014 Feb;44(2):51-6.

Molecular methods are the gold standard techniques for the detection of these resistance enzymes but they are time consuming.

The OXA-48 Card Letitest is a rapid diagnostic test which detects OXA-48 carbapenemase from one single colony grown on solid medium in 15 minutes.

OBJECTIVES

The aim of this study was to evaluate the performance of the OXA-48 test in a set of isolates with well characterized resistance mechanisms.

MATERIAL/ METHODS

The OXA-48 Card Letitest is an immunochromatographic sandwich test that uses capture antibodies against an OXA-48 epitope bound to a nitrocellulose membrane. Detection antibodies against a second OXA-48 epitope are conjugated to colloidal gold particles. The sample and the detection antibody conjugate are resuspended together and move through the test strip by passive diffusion. If the isolate contains an OXA-48 carbapenemase the antigen and antibody conjugate bind to the capture antibodies producing a color band in the test stip.

Thirty-six strains with confirmed OXA-48 carbapenemase by molecular techniques (31 *Klebsiella pneumoniae*, two *Escherichia coli*, two *Enterobacter cloacae*, one *Enterobacter aerogenes*) and one *K. pneumoniae* strain with an OXA-181 (OXA-48 family) were analyzed. All *K. pneumoniae* but one (Amp C cephamycinase) also expressed an extended spectrum ß-lactamase (ESBL). The two *E. coli* isolates also harbored an ESBL and one of them a VIM-1 carbapenemase. In addition, 20 strains with several resistance mechanisms to betalactam antibiotics were included in the study.

Identification (N of strains)	β-lactamase: carbapenemase or ESBL (N of strains)
Escherichia coli (8)	ESBL (4), KPC-2+VIM-1 (2), NDM-1 (1), NDM-2(1)
Acinetobacter baumanii (4)	OXA-23 (1), OXA-40 (1), OXA-51 (1), OXA-58 (1)
Klebsiella pneumoniae (2)	KPC-2 (1), KPC-3 (1)
Acinetobacter pitii (1)	NDM-1 (1)
Enterobacter asburiae (1)	KPC-2 (1)
Enterobacter cloacae (1)	VIM-1 (1)
Klebsiella oxytoca (1)	VIM-1 (1)
Pseudomonas aeruginosa (1)	VIM-2 (1)
Serratia marcescens (1)	SME-1 (1)

Table 1. Identification and harbored ß-lactamase of the 20 additional strains included in the study.

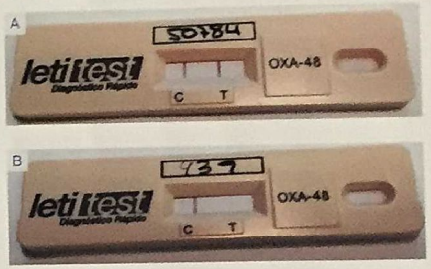

Figure 2. Positive (**A**) and negative (**B**) results obtained by the OXA-48 Card Letitest.

RESULTS

All 37 strains harboring an OXA-48 or OXA-181 resistance gene had a positive result using the OXA-48 test. The 20 negative controls, expressing ESBL or KPC, NDM, SME, VIM carbapenemases as well as the OXA-type carbapenemases not belonging to the OXA-48 family showed a negative result using the test. The concordance obtained in this study was 100% as well as the specificity and sensitivity.

CONCLUSIONS

The results obtained showed that the OXA-48 Card Letitest is able to detect the carbapenemase OXA-48, including an OXA-181, from a one single culture colony with a high sensibility and specificity. This test is easy to perform and its turnaround time is only 15 min. The main limitation is that only one resistant mechanism can be identified.

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