Rapid and accurate detection of OXA-48 like carbapenemases in Enterobacteriaceae using the OXA-48 K-SeT kit

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Introduction and Aim

- Oxacillinase (OXA)-48 like carbapenemases present a diagnostic challenge, particularly due to their low carbapenem minimum inhibitory concentration (MICs).
- Molecular assays are costly, potentially labour intensive and often not available in all laboratories, creating a need for referral which results in prolonged turn-around time.
- Rapid and accurate tests are required to convey timeous results to clinicians so that appropriate treatment and infection control measures can be implemented.

The OXA-48 K-SeT assay (Coris Bioconcept, Belgium) is an immunochromatographic lateral flow assay that relies on the immunological capture of two epitopes specific to the OXA-48 enzyme using colloidal gold nanoparticles bound to a nitrocellulose membrane within a lateral flow device. Capture and detection antibodies were designed to bind all current OXA-48-like variants (OXA-48, -181, -204, -232, and -244)1
- Previous studies conducted in Europe have shown the assay to be highly sensitive and specific.1,2,3
- To our knowledge there are no published studies evaluating this kit in South Africa or the African continent
- The aim of this study was to evaluate the OXA-48 K-SeT test for the detection of OXA-48 and OXA-48 like variants in a high Carbapenem Resistant Enterobacteriaceae (CRE) prevalence setting.

Methods

- Ninety stored, previously characterised Enterobacterial isolates were used for this study. These isolates were collected from patient samples from three different hospitals (Tertiary and regional) in and around Pretoria (South Africa), and Calgary (Canada).
- K. pneumoniae ATCC BAA 1705 was used as the negative control, the rest were clinical isolates (K. pneumoniae n = 71; E. cloacae n = 6, P. rettgeri n = 4; E. coli n = 4, M. morgannii = 2; P. mirabilis n = 1; E. aerogenes n = 1; K. oxytoca n = 1).
- All isolates were sub-cultured onto Mueller Hinton agar prior to being tested.
- The OXA-48 K-SeT test (Coris Bioconcept, Belgium) was performed and interpreted according to manufacturer’s instructions.
- Sanger sequencing of the blaOXA-48 alleles were undertaken for all isolates detected as positive by the OXA 48 K-set kit. Descriptive statistical analysis was performed.

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Results

- The OXA-48 K-SeT test detected 51 isolates previously identified as OXA-48 like positive by PCR which included OXA-181 (n=45), OXA-162, OXA-232, OXA-244, OXA-370 and OXA-48.
- All non OXA-48 producers (n=39) were detected as negative, these comprised of NMDs (n=23), VIMs (n=8), high level AmpC (n=6), KPC (n=1) and 1 ESBL producing K.pneumoniae. Sensitivity and specificity were calculated to be 100%.
- Majority of positive results were observed within five minutes. One isolate was positive after 13min with a faint band which according to the kit insert should be reported as positive (Fig 1B).
- This was a P.mirabilis (oaxa-181)

Conclusion

- The OXA-48 K-SeT is a rapid, highly sensitive and specific test that can be used for the detection of OXA-48 and variants in Carbapenem Resistant Enterobacteriaceae. The test is easy to perform with minimal training and hands on time required.
- Results observed in this study were also observed in other studies evaluating the OXA 48 K-Set test.1,2,3
- Use of this test can be particularly useful in an outbreak setting or areas with a high OXA-48 prevalence so that timeous infection control procedures can be implemented.

References