

Improving performance of cholera rapid diagnostic tests

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Background

Despite the potential role of cholera rapid diagnostic tests (RDT) in outbreak detection and response, the poor diagnostic performance reported has led to mistrust of their results. There is currently no cholera RDT recommended by MSF. An enrichment step was proposed to improve specificity. We describe a prospective diagnostic evaluation of the Crystal VC RDT (Span Diagnostics, India) with or without enrichment step and culture compared to polymerase chain reaction (PCR) during a cholera outbreak in Juba, South Sudan.

Objective

RDTs were performed directly on stool and on alkaline peptone water inoculated with stools and incubated at ambient temperature for 4 to 6 hours. Cholera culture was performed from wet filter paper inoculated with stools. PCR was done from stool inoculated on dry Whatman 903 filter papers, and from wet filter paper supernatant.

Methods

In August and September 2015, 104 consecutive suspected cholera cases were enrolled. *Vibrio cholerae* O1 was detected by PCR in 38 (36.5%). When considering the O1 line only, the direct RDT had 94.7% (95% CI: 82.3-99.4) sensitivity and 80.0% (95% CI: 62.8-88.9) specificity.

When including the O139 line as positive, the specificity of the direct RDT dropped to 69.2% (95% CI: 56.6-80.1). The enriched RDT had 84.2% (95% CI: 68.7-94.0) sensitivity and 100% (95% CI: 94.5-100) specificity. Culture on site had 81.6% (65.7-92.3) sensitivity and 98.5% (91.8-100) specificity compared to PCR.

Results

These results confirm the high sensitivity and moderate specificity of Crystal VC performed directly on stool. The addition of an enrichment step greatly improves specificity, while ensuring a sensitivity comparable to that of culture. Further evaluation of all reliable cholera RDTs available could lead to the identification of other simple options for cholera outbreak detection, including tests detecting only *V. cholerae* O1, which remains the sole serogroup causing cholera epidemics worldwide.

The addition of a simple enrichment step increased the performance of the cholera rapid test Crystal VC to a level similar to culture.