Introduction
Global spread of carbapenemase producing Enterobacteriaceae (CPE) is a critical threat to public health\(^1\). Rapid, sensitive and specific methods of screening patients for CPE colonisation are paramount, especially with increasing interest in medical tourism. Using a clinically effective in-vitro human gut model we compared the relative accuracy of routine screening methods commonly used in clinical practice. A well validated, methods commonly used in accuracy of routine screening we compared the relative

Method
Three gut models were seeded with pooled faeces from four healthy volunteers. Following an initial equilibration phase, the models were spiked with increasing inocula of carbapenemase-producing (CP) Klebsiella pneumoniae (range 1.8-8.9 log10 cfu/mL) - Figure 1.

Results
A total of 237 samples were tested. CPE were detected after an inoculation of \(~4.9\) log10 cfu/mL, and populations increased as CPE inocula increased. After inoculation, populations stabilised at \(4-6\) log10 cfu/mL in vessel 3 - Figure 2. MAC-IMI agar was inferior to (lower limit of detection (LOD) 1.66log10cfu/ml) and less reliable than the commercial agars, which had similar sensitivity and a LOD of 0.82 log10 cfu/ml - Figure 2. Sensitivity and specificity of the molecular tests were calculated using the reference method of triplicate positive culture. The results are summarised in Figure 3. XCR showed decreased sensitivity but increased specificity for KPC and OXA48 compared with CDCPE. Both methods had similar sensitivity for NDM, but XCR had higher specificity.

Conclusion
• The in-vitro gut model is a useful approach to measure CPE screening efficacy.
• Selective media had the highest sensitivity, but do not provide gene identification and require 24hrs incubation.
• CDCPE had lower specificity compared with XCR for individual gene identification – the higher false-positive rate may undermine its use for tracking outbreaks and for infection control interventions.

References

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