CUTTING TURN-AROUND-TIME: A NEW CARBAPENEMASE-PRODUCING ENTEROBACTERALES SCREENING APPROACH

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1. Introduction

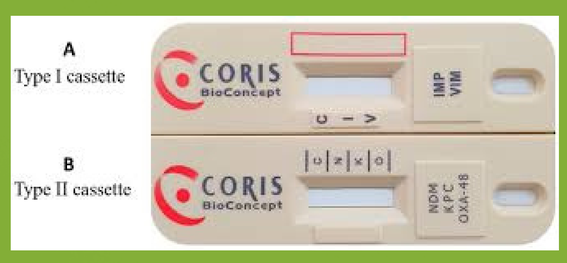
In our institution, carbapenem-resistant Enterobacterales (CRE) is the leading multi-drug resistant organism. Carbapenem resistance in Enterobacterales is caused by various mechanisms including carbapenemase production. Some of the carbapenemases are transmitted horizontally between patients. This is of huge public health concern. Therefore, early detection is critical. Rectal swab CRE screening by the CDC method [1] takes several days for results. In order to reduce the turn-around time of results, a new testing algorithm was verified.

2. Method

40 isolates used (Table 1)

1 Swabs inoculated with the cultured organism were plated onto CHROMID CARBA-SMART (Biomerieux) plates.

2 If colonies suggestive of Enterobacterales grew, these were tested on the RESIST-5 OKNVI kit (Coris, BioConcept) for carbapenemases.



3 For the verification, all carbapenemase positive and negative isolates were identified by the Rapid ID panel on Microscan (Beckman & Coulter).

4 Test reproducibility was assessed by 2 technologists over 3 days using the same 5 isolates (3 CPE and 2 non-CRE).

5 The acceptance criteria for the test algorithm was accuracy ≥ 90% and reproducibility of ≥ 95% [2].

$$\text{Accuracy} = \frac{TP + TN}{(TP + TN + FP + FN)} \times 100$$

TP= True positives TN= True negative
FP= False positives FN= False negatives

$$\text{Reproducibility} = \frac{\text{Sum of correct results attained by the 2 technologists}}{\text{Sum of all results expected to be attained by the 2 technologists}} \times 100$$

Table 1

Number of Isolates	Isolate Type
17	Carbapenemase-producing Enterobacterales (CPE)
3	Non- CPE but carbapenem-resistant Enterobacterales (CRE)
10	Non-CRE
4	Enterococci
3	Carbapenem-resistant *Acinetobacter baumannii* (CRAB)
3	Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA)

3. Results

All results were finalised within 24 hours. Test accuracy was 95% and reproducibility 100%. Additionally, total test cost was reduced by ~R186 for a positive CPE isolate and by ~R70 for a non-CRE isolate compared to the previous method used [1].

4. Conclusion

This study highlights a lower cost and simplified testing algorithm for CRE screening which will provide results faster.

5. References

1. Laboratory Protocol for Detection Of Carbapenem-Resistant Or Carbapenemase-Producing Klebsiella spp. And E coli From Rectal Swabs (Centre for disease control and prevention).

2. N Godfrey (2023), NHLS SOP- GPL1530: Verification /validation of quantitative and qualitative methods.