

O0175 **Fast and expensive or cheap and slow? A mathematical modelling study to explore screening for carbapenem resistance in UK hospitals**

Gwen Knight<sup>1,2</sup>, Eleonora Dyakova<sup>3</sup>, Siddharth Mookerjee<sup>3</sup>, Frances Davies<sup>3</sup>, Eimear Brannigan<sup>3</sup>, Jonathan Otter<sup>\*3,4</sup>, Alison H. Holmes<sup>3,4</sup>

*<sup>1</sup>London School of Hygiene and Tropical Medicine, <sup>2</sup>National Institute of Health Research Health Protection Research Unit in Healthcare Associated Infection and Antimicrobial Resistance, Commonwealth Building, Hammersmith Campus, Imperial College London, Du Cane Road, London, W12 0NN, United Kingdom, <sup>3</sup>Imperial College Healthcare NHS Trust, <sup>4</sup>National Institute of Health Research Health Protection Research Unit in Healthcare Associated Infection and Antimicrobial Resistance, Commonwealth Building, Hammersmith Campus, Imperial College London, Du Cane Road, London, W12 0NN, United Kingdom*

**Background:** Enterobacteriaceae are a common cause of hospital infections. Carbapenems are a clinically effective and well tolerated treatment of such infections. However, antibiotic resistance is on the rise. In particular, carbapenemase producing carbapenem-resistant Enterobacteriaceae (CP-CRE) are increasingly common locally, nationally, and globally. Different screening methods are available for detection of carriage of CP-CRE. We aimed to compare the impact and costs of a “Direct PCR” algorithm vs. two approaches that combine culture with PCR in detecting CP-CRE carriage.

**Materials/methods:** We developed an individual-based mathematical simulation model to compare three screening algorithms using data from a UK NHS Trust. The first, a “Direct PCR” algorithm was highly sensitive/specific, quick (half a day) but expensive. The second, “Culture + PCR” algorithm required 2.5 days but was relatively sensitive/specific and accurate but slower. A third, “PHE” algorithm, repeated the “Culture+PCR” three times with an additional highly accurate PCR but slowest overall. Scenario analysis was used to compare several prevalence and coverage of screening (i.e. compliance with a screening policy) scenarios representing different specialities at our Trust, as well as isolation strategies.

**Results:** In the ICU using current estimates of CP-CRE prevalence and screening coverage, we found that although a “Direct PCR” algorithm would have most impact in reducing the number of CP-CRE “days at risk” (492 vs. 650), the cost per risk day averted for patients with CP-CRE per year was substantially higher than a “Culture + PCR” algorithm (£174 vs. £53). These results were robust to sensitivity analyses.

**Conclusions:** Our results indicate that a “Culture + PCR” algorithm provides the optimal balance of cost and risk days averted, at varying isolation, prevalence and screening coverage scenarios. Findings from this study will help organisations determine the optimal screening approach for CP-CRE, balancing risk and resources.