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A cost analysis of the conventional culture method versus polymerase chain reaction testing for methicillin-resistant staphylococcus aureus at a South African public hospital

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ABSTRACT

Methicillin-Resistant *Staphylococcus aureus* (MRSA) infections increase the cost and consequences of patient care within hospitals. Patients can be tested for MRSA using the Conventional Culture Method or new rapid Polymerase Chain Reaction (PCR) tests, such as the Xpert MRSA test. International studies have compared the costs and consequent management pathways for these two methods of MRSA testing. However, in the South African context where socio-economic status and access to healthcare may contribute different influences, no such models exist. Therefore, the aim of this study was to investigate the costs of the management pathways associated with using the current Conventional Culture Method for MRSA testing, to construct decision-tree-analytic models and compare them to the new PCR testing, in order to inform decision-making.

TreeAge decision-tree-analytic models were developed to depict the current pathways, and associated costs, incurred by patients with a suspected MRSA infection in an orthopaedic and vascular ward at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) in South Africa in 2013. These models were then compared to theoretical pathways including implementing the Xpert MRSA. The models were populated with input parameters from observations conducted in the two wards, the microbiology laboratory and the main dispensary, and costs were calculated using the retrospective utilization reviews formulated from the antibiotics administered and laboratory tests that isolated MRSA in the study population. Sensitivity analyses were performed to evaluate the effect of the variables on the models.

The average total cost of antibiotics and MRSA laboratory tests utilised per patient in the orthopaedic and vascular wards were R3 846.82 and R2 964.39 respectively. Based on ethnographic observations and retrospective utilization reviews, three pathways for a patient with a suspected infection were identified: Empiric Antibiotics followed by Microscopy, Culture and Sensitivity (MCS); MCS followed by Empiric Antibiotics; Empiric Antibiotics and MCS concurrently. The fourth pathway included implementing the Xpert MRSA test. Analysis of these pathways revealed that implementation of the Xpert MRSA would be the optimal strategy in the orthopaedic ward, but the most expensive strategy in the vascular ward.

In conclusion, these costs and pathways highlight the utilization of scarce resources. Thus, it is suggested that, before new methods of MRSA testing are introduced, the current practices and pathways for patients with a suspected MRSA infection should be further evaluated and improved.