Xpert MRSA screening in surgical patient flow; time for a rethink for hub-and-spoke laboratory models?

Simon Rabinowicz,1 Matthew O’Hare,1 Luke S.P. Moore1,2,3 and Nabeela Mughal1,2,3,*

Abstract

The move towards pathology networks and hub-and-spoke models of medical laboratory service provision has significantly changed the flow of samples, and the impact of results on patients, over recent years. At the same time advances in technology, including rapid, simple to use molecular platforms, are changing the way microbiology results can be utilized. Like many other medical microbiology laboratories, we struggle with this balance for many different sample types and test requests. Work published by Neilsen et al. in Journal of Medical Microbiology last year looked at this balance for methicillin-resistant Staphylococcus aureus (MRSA) genotypic diagnostics and suggested significant cost savings when a whole-healthcare economy perspective was adopted. However, as with all changes, implementing MRSA molecular diagnostics in different clinical settings must be considered carefully. We add to this discussion in our accompanying letter, detailing our experience (in a hub-and-spoke medical microbiology laboratory setting) of ‘rapid’ MRSA molecular diagnostics for day-case surgery where pre-operative assessment had been missed, exploring the impact and costs of these tests. We find no impact on patient care, but at considerable additional cost. We hope this will add a cautionary note to those considering implementing molecular microbiology diagnostics, and reopen the debate on where, in hub-and-spoke laboratory models, such devices should be situated.

Dear Professor Fry/Professor Mathee,

Neilsen et al. [1] suggest that despite laboratory costs being higher for rapid meticillin-resistant Staphylococcus aureus (MRSA) PCR assays, once the costs of patient isolation are taken into account, these assays offer the potential for significant cost savings for the whole-healthcare economy. In the context of surgical screening for patients undergoing same-day surgery however, different issues around utility, speed of results and economic savings from MRSA PCR exist. We assessed the clinical impact of MRSA PCR on same-day surgery in the context of an off-site laboratory.

We performed a single-centre retrospective observational study among patients undergoing same-day surgery in a central London teaching hospital (April 2016–March 2017), identifying those who had MRSA PCR screening (via Cepheid Xpert MRSA) sent on the morning of surgery (for patients who had missed/not had pre-assessment MRSA culture-based screening undertaken). Laboratory and demographic data was collected from Sunquest Gateway 7.3.1, and clinical data was extracted from patient records.

In total, 56 patients (27 female/29 male) with a mean age of 42 years (range 16–82 years) were identified, of which two had positive MRSA PCRs. Overall, 17 were undergoing orthopaedic surgery, 7 gynaecological, 2 urological and 30 other. Sample-to-result MRSA PCR took a median of 5 h 10 min. This included median sample-to-laboratory time of 1 h 30 min where samples were sent first thing in the morning as intended, but up to 22 h 31 min when belatedly sent in the afternoon. For the two patients who had MRSA positive results, there were no changes in peri-operative antimicrobial therapy (specifically anti-MRSA antimicrobials were not administered). Deep clean of the theatre was not enacted after these two patients.

MRSA PCR for these patients was conducted at a cost of £1579, compared to culture-based techniques, which would have costed £255. This equated to an opportunity cost of £1324 with no discernible impact on patient flow in this study. Nationally, surgical site infections contribute to 16% of healthcare associated infections, of which 4% are attributable to MRSA [2]. Estimates for the attributable cost of such surgical site infections in England put the median at £5239 across surgical categories [3], and there is an
associated higher mortality, longer hospital stays and increased readmission rates [4].

Molecular microbiology diagnostics, such as PCR, are currently more expensive than culture-based methods but potentially offer a significantly faster, more precise diagnostic result, including being able to determine the presence of non-dividing bacteria (e.g. in those in biofilms). From a whole-healthcare economy perspective rapid determination of pre-operative carriage of pathogens, which may cause surgical site infections may be beneficial. However, in the context of a hub-and-spoke model of laboratory services provision, we find pre-operative screening for MRSA with PCR on the morning of surgery does not provide a clinically useful sample-to-result time nor impact peri-surgical management of patients. When MRSA positive results were available, they were not utilized to change clinical decision making. Given the movement of UK pathology services towards consolidated laboratory hubs, the role of rapid molecular microbiology diagnostics, where they are sited, and their integration into patient pathways, needs to be carefully considered to optimize their utility. Clear formal cost-effectiveness analyses of these rapid diagnostics are needed, and must be considered in a variety of models of pathology service provision.

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References