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Evaluation of a real-time PCR method for detection of nasal methicilin-resistant Staphylococcus aureus (Xpert MRSA NxG®) in patients with carriage risk factors at the time of admission to a general hospital

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Background: Methicillin-Resistant *Staphylococcus aureus* (MRSA) is a major cause of healthcare-acquired infections. On admission to acute hospitals, patients with MRSA carriage risk factors (MRSAcRFs) are treated in isolation until culture results are available. This complicates management of hospital beds as test results are typically reported in 4 to 5 days. Real-time PCR assays could improve this situation since they provide MRSA results in a few hours. Limitations of previous PCR assays have been discordant culture/PCR results. New real-time PCR assays are best adapted to MRSA molecular diversity and their evaluation in patients with MRSAcRFs could be useful to determine performance.
Material/methods: From April to October 2016, we conducted a prospective MRSA carriage screening study in a general hospital with the aim of assessing new real-time PCR assay performance in patients with MRSAcRFs. At the time of admission, we performed a single swab for each anterior naris to determine the presence of MRSA by culture and by real-time PCR Xpert MRSA NxG® assay. We registered demographic data, MRSAcRFs, and compared culture and molecular assay results. Also compared were patient demographics and MRSAcRFs between culture positive and PCR positive (C+/PCR+), with discordant results.

Results: Median age of patients was 81 years (IQR 71-86) and 53.2% were female. Screening criteria were long term care facility (LTC) resident, history of MRSA and recent hospital discharge [22(46.8%), 21(44.7%) and 4(8.5%), respectively]. Most frequent environmental MRSAcRFs found were LTC

residents, recent inpatient at acute care hospitals or intensive care units [39(82.9%), 19(40.4%) and 4(8.5%), respectively]. Most frequently found patient MRSAcRFs were history of MRSA [26 (55.3%), 16 (61.5%) of them had previously had mupirocin-based decolonization], recent antibiotic consumption [21(44.7%)] and presence of skin ulcers [13(27.7%)]. Of the 196 specimens evaluated, 29(14.8%) were culture and PCR positive, 149(76%) were culture and PCR negative, 18(9.2%) were culture negative and PCR positive, and no culture positive and PCR negative. Compared with the results of culture, the sensitivity, specificity, and negative and positive predictive values (PV) of the PCR assay were 100%, 89.2%, 100%, and 63.1%, respectively. Discordant results were more frequent when the reasons for screening were history of MRSA (61.9% MRSA vs 19.2% recent health care contact, $p<0.003$) and recent antibiotic consumption (52.4% antibiotic vs 26.1% without, $p=0.07$). No other demographic or MRSAcRF differences were observed between C+/PCR+ and discordant results.

Conclusions: Our results show than Xpert MRSA NxG® performed well as a screening test in patients with MRSAcRFs (100% negative PV). We found an elevated number of PCR positive discordant results (9.2%), more frequently in patients with a history of MRSA and recent antibiotic consumption. More studies are needed to determine whether these discordant cases are real MRSA carriers or false positives.