In vitro antimicrobial susceptibilities of Methicillin-resistant Staphylococcus epidermidis

P. Christoffer Lindemann¹,², Rune Skjåstad¹,², Heidi E. Haraldsen², Olav Lutro³, Harald G. Wiker¹,², Haima Mylvaganam¹

Objective
Staphylococcus epidermidis frequently causes infections in immunocompromised patients and patients with catheters or implants. Most isolates are methicillin resistant, thus resistant to most β-lactam antibiotics. These infections are often treated with vancomycin, but treatment failure can occur due to biofilm formation, often necessitating the removal of catheters or implants. This study tests the in vitro activity of a wider spectrum of antibiotics for treatment of methicillin-resistant S. epidermidis (MRSE).

Materials & Methods
- 72 MRSE isolates regarded as clinically relevant and isolated at the Dept. of Microbiology, Haukeland University Hospital, Norway, during 2011 were included;
  - 52 from blood cultures
  - 20 from sites such as cerebrospinal fluid, burns and foreign body related infections.
- The isolates were identified as S. epidermidis by Vitek®2 and as MRSE based on non-susceptibility to oxacillin. All isolates were subjected to mecA/nuc PCR.
- Minimal inhibitory concentrations for 13 relevant antibiotics were determined using EUCAST clinical breakpoints.

Results
All isolates were found to have mecA, but not nuc, consistent with MRSE.
- The MIC₅₀, MIC₉₀ and the percentage of non-susceptible isolates for each of the tested antibiotics are presented in the table.
- Co-resistance was found in all but one isolate, and 83 % of the isolates were resistant to multiple antibiotic classes.
- Resistance to erythromycin was found in 74 % of the isolates of which 64 % had a constitutive MLS₉ resistance, 25 % an inducible MLS₉ resistance and 11 % had an efflux mechanism.

Conclusions
- The high prevalence of resistance to gentamicin, fluoroquinolones, trimethoprim-sulfamethoxazole, erythromycin and clindamycin indicate that these antibiotics are unsuitable for empirical treatment.
- Screening for mecA and nuc directly from patient samples and finding only mecA would indicate considerable co-resistance.
- Relevant antibiotics to use alone or in combination seem to be vancomycin, linezolid, tigecycline and rifampicin. However, their effect on biofilm associated MRSE infections remains to be studied.

Acknowledgements
Liofilchem is acknowledged for their kind donation of MIC Test Strips for this project.
Technicians Bente Skjellstad, Eirik Nybakken and Kathe Skræmsta at the Department of Microbiology, Haukeland University Hospital are acknowledged for their assistance with mecA/nuc PCR and isolate-handling.

paul.lindemann@gades.uib.no