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Extra-nasal methicillin-resistant *Staphylococcus aureus* colonization and maintenance hemodialysis patients

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Methicillin resistant *Staphylococcus aureus* (MRSA) infections of endogenous origin are important causes of morbidity and mortality in immunocompromised hemodialysis patients. MRSA colonization at extra-renal sites is increasingly recognized in patient subpopulations at risk. However, the prevalence of extrarenal MRSA colonization in dialysis patients is largely unknown. Of clinical importance, extra-nasal MRSA colonization predisposes to blood stream infections in hemodialysis patients with non-cuffed central vein catheter. Routine extra-nasal testing of hemodialysis patients should be recommended for successful decolonization and reduction of life-threatening infections.
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Staphylococcus aureus infections remain common in maintenance haemodialysis (HD) patients. The consequences of these infections, particularly blood stream infections with methicillin-resistant *S. aureus* (MRSA) are potentially severe and entail costly therapy. Patients with end-stage renal disease are exceedingly vulnerable to S. aureus infections for many reasons, including a) the immunosuppressed state of uremia and the high burden of comorbid diseases; b) the exposure to other patients or health care workers in the HD facility three times per week; c) frequent hospitalisations and antibiotic regimens; d) the invasive nature of the HD procedure (central venous catheter, arterio-venous fistula) and the high prevalence rates for *S. aureus*/MRSA colonization. Efforts specifically directed at the reduction of MRSA infection rates have focused on transmission dynamics and have included screening for nasal colonization, decolonization and barrier strategies (1). Numerous studies from around the world have demonstrated a high prevalence of nasal *S. aureus*/MRSA colonization in ESRD patients undergoing haemodialysis treatment. Nasal MRSA colonization of patients on extracorporeal maintenance HD has been associated with higher subsequent risk of infection/bacteraemia and repeated hospital admissions. MRSA nasal colonization may also be a marker for a more general vulnerability of individual HD patients and for an increased risk for all-cause mortality (2).

A meta-analysis including 38 relevant studies (5596 dialysis patients) showed that the pooled prevalence of nasal MRSA colonization was about 7 % of patients receiving regular haemodialysis therapy (3). However, nasal colonization varies with geographic region, patient characteristics, sampling methods (collection system, number of swabs) and detection techniques (direct plating or PCR).

False negative culture results may arise from sampling errors or insensitive collection methods. Moreover, longitudinal investigations utilizing two or more nasal swabs revealed three patterns of *S. aureus* or MRSA nasal carriage. They could be defined both in patients maintained on haemodialysis as well as for healthy adults as (1) persistent carriers, (2) intermittent carriers and (3) persistent non-carriers (1). True negative cultures can be found in non-carriers, but also in patients with intermittent MRSA carriage. Real time PCR is the only current method with a sensitivity approaching 100% (1). Extra-nasal *S. aureus* colonization (oropharynx, inguinal region, axilla, vascular access or other sites) is more common as currently assumed with a prevalence of approximately one third of all dialysis patients (4). In certain body sites it may be even more common than nasal colonization. Extra-nasal *S. aureus* carriage is as significant as nasal carriage for S. aureus blood stream infections in patients on HD (5). There are only few data describing extra-nasal colonization with MRSA among

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maintenance haemodialysis patients. We found that 32 % of patients with MRSA carriage were colonized in more than one body site (2,6). Zahed et al reported a low extra-nasal MRSA colonization rate of 1.7 %. Extra-nasal MRSA screening in HD patients will increase MRSA detection by more than 30 % compared with nares screening alone. Extra-nasal testing of HD patients may be a valuable strategy for outbreak control in a setting of persistent MRSA infection.

Eradication of MRSA carriage by decolonization and enhanced infection prevention protocols is a crucial clinical challenge, as it may reduce the risk of life-threatening infection of colonized haemodialysis patients and prevent MRSA transmission to other patients who were not colonized. However, the success rate of the decolonization procedure may be high in patients with only nasal MRSA carriage, but significantly lower in patients with additional extra-nasal (wounds, throat) MRSA colonization (7). Nevertheless, to achieve MRSA decolonization we need to consider not just nasal decolonization but also decolonization of the skin and oropharynx.

Author's contribution

HS wrote the manuscript alone.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author.

Conflicts of interest

The author declares no conflict of interest.

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