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High occurrence of high-level mupirocin & chlorhexidine resistant genes in methicillin resistant staphylococcal isolates from dialysis unit of a tertiary care hospital

Sir,

Chronic hemodialysis (CHD) patients are vulnerable to infections, including infections by methicillin-resistant staphylococci (MRS) because they are repeatedly exposed to the hospital environment and often receive prolonged courses of antibiotics, besides being immunocompromised[1]. Nasal carriage of MRS in hospital personnel also adds to the colonization pressure in healthcare facilities, acting as reservoirs for transmission to these patients[1]. Routine use of mupirocin and chlorhexidine in healthcare settings has contributed to acquisition of resistance to these antimicrobial agents among microbes which cause outbreaks in these settings[2]. Resistance to mupirocin is of low-level (mutations in the chromosomal *ileS* gene) or high-level [by a plasmid-mediated *mupA* (*ileS2*) gene, encoding a novel IleS][3]. Chlorhexidine resistance is conferred by the plasmid- mediated *qacA/B* genes which encode proton-dependent multidrug efflux pumps[4]. We conducted a cross-sectional study to detect the presence of mupirocin and chlorhexidine resistance among methicillin resistant staphylococcal isolates obtained from the dialysis unit of a tertiary care hospital.

A total of 83 non-duplicate methicillin resistant coagulase negative staphylococcal (MRCoNS) isolates from anterior nares of CHD patients (n=124) and hospital personnel (n=30) from dialysis unit of Billroth Hospital, a tertiary care centre in Chennai, Tamil Nadu, India, were included in this study. Phenotypic detection of low- and high-level mupirocin resistance was carried out using mupirocin discs [5 and 200 µg (Hi-Media, Mumbai)] and minimum inhibitory concentration (MIC) for mupirocin was determined by agar dilution method[5,6]. *Staphylococcus aureus* ATCC 25923 was used as quality control strain and results were interpreted as per Clinical and Laboratory Standards Institute (CLSI) guidelines and British Society for Antimicrobial Chemotherapy (BSAC) guidelines[5,6]. Isolates resistant to 5 and 200 µg mupirocin discs were further subjected to *mupA* gene detection[7]. All isolates were screened for the presence of chlorhexidine resistance gene (*qacA/B)* by PCR[8].

Of the 83 MRCoNS isolates, 68 (81.9%) were from CHD patients and 15 (18%) from dialysis unit staff members. Mupirocin resistance was observed in 26 (31.3%) isolates, of which, 22 (26.5%) exhibited high-level mupirocin resistance (HLMR) and were also positive for *mupA* gene. In our study, mupirocin resistance was slightly higher than that reported from another study from south India[9]. Majority of the isolates showing HLMR (n=16, 19.2%) were isolated from CHD patients. Six of 22 (27.3%) isolates with HLMR displayed *qacA/B*. The distribution of chlorhexidine resistance genes among high- and low-level mupirocin resistant and mupirocin sensitive isolates are shown in the Table. In this study, mupirocin sensitive isolates (12/83, 14.4%) were found to harbour higher percentage of *qacA/B* genes compared to mupirocin resistant isolates (8/83, 9.6%).

In conclusion, our findings indicate that the routine use of chlorhexidine and mupirocin prophylaxis may increase the prevalence of chlorhexidine- and

Table. Distribution of chlorhexidine resistance genes in high and low-level mupirocin resistant and mupirocin sensitive isolates

No. & source of MRCoNS isolates	*qacA/B* positive (%)	*qacA/B* negative (%)
High-level mupirocin resistance (MIC ≥ 512 µg/ml)		
CHD patients (16)	3 (18.7)	13 (81.2)
Dialysis unit staffs (6)	3 (50)	3 (50)
Low-level mupirocin resistance (MIC 8-256 µg/ml)		
CHD patients (4)	2 (50)	2 (50)
Dialysis unit staff (0)	0	0
Mupirocin-susceptible (MIC < 8 µg/ml)		
CHD patients (48)	8 (16.6)	40 (83.3)
Dialysis unit staff (9)	4 (44.4)	5 (55.5)

MRCoNS, methicillin resistant coagulase-negative staphylococci

mupirocin-resistance genes in staphylococci in a hospital setting.

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***Conflicts of Interest*:** None.

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