Reduced susceptibility to Vancomycin in methicillin resistant *Staphylococcus aureus*: a time for action

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**ABSTRACT**

Infections by Methicillin resistant *Staphylococcus aureus* (MRSA) is an often encountered therapeutic challenge. The problem is accentuated by the emergence of MRSA strains which are resistant to Vancomycin, the recommended agent for the treatment of MRSA infections. We therefore carried out this study to determine the MIC values of vancomycin for the MRSA isolated from different clinical specimens in Nepal Medical College. MICs were determined by agar dilution method. Out of the 82 MRSA isolates tested, 18 showed MIC of 2μg/ml and 29 isolates had MIC of 1μg/ml and 35 isolates had MIC of 0.5 μg/ml.Although none had a MIC in the intermediate or resistant zone, 18 (2.9%) had MIC in the upper limit of the sensitive zone which is a matter of concern and calls for prompt preventive actions.

**RESULTS**

Among the 82 MRSA isolates tested, all had MIC for vancomycin within the susceptible range. However, MIC towards the upper limit of the susceptible range (2μg/ml) was found for 21.9% of the isolates (Table-1).

**DISCUSSION**

Vancomycin was introduced clinically in 1958 for the treatment of gram positive bacteria. Its use has increased dramatically due to the increase in the prevalence of methicillin resistance in both coagulase negative staphylococci and *Staphylococcus aureus*. The first report of decreased susceptibility to vancomycin in
Staphylococcus aureus (VISA) came in 1997 from Japan. Since then reports from around the world are emerging. No vancomycin intermediate or resistant strains were found in the current study. Nevertheless, it is worrisome that 22% of the strains had the MIC in the higher limits of microbial susceptibility. Clinical failure due to hetero resistant strains are likely in infections caused by strains with elevated MIC. In a study 66 patients with vancomycin MICs of ≥1.5 mg/liter had a 2.4-fold increase in failure compared to patients with MICs of ≤1.0 mg/liter. Although some studies from abroad have reported the MIC for vancomycin for MRSA similar to our study (2 μg/ml), others have found different prevalence of VISA and VRSA among their clinical isolates. Two strains of VRSA and six strains of intermediate (VISA) were reported from Northern India. Song et al reported 6.3% VISA among the MRSA and Thati et al reported 1.9% VRSA among their clinical isolates. No VISA or VRSA have been reported as yet from Nepal. However, this study was prompted by the author’s experience in tertiary care hospital in Lalitpur, Nepal where 9.5% prevalence of VISA among the MRSA was recorded.

The possible mechanism behind the vancomycin resistance in staphylococcal isolates could be the thickening of cell wall in resistant isolates. Recent exposure to vancomycin within one month of the current infection, prior recent hospitalization, surgery within last 6 months and those with blood stream infections prior to admission in intensive care unit may result in MRSA infection with higher vancomycin MIC. VRSA are resistant to large number of currently used antimicrobial agents compromising the treatment options and increasing morbidity and mortality. In our study all the MRSA were multidrug resistant and among them a large number of isolates with MIC of vancomycin 2 μg/ml were resistant to higher number of drugs.

The emergence of VISA/VISA may be due to selection pressure. The huge scale development and subsequent spread of resistance to vancomycin is a fearsome threat to the already challenging therapy of MRSA. Strong organizational support and multiple strategies are required for the containment and prevention of MRSA and thus of VISA/VRSA. Infection control practices that have been documented to reduce the MRSA spread include: adherence to hand hygiene, contact precautions for patients with MRSA, active surveillance cultures, education, effective environmental cleaning and communication between healthcare workers and patients with MRSA.

Thus this study is an early alarm to all stakeholders to take adequate and timely measures to stop the emergence of VISA/VRSA. Strict infection control practices must be religiously followed. Regular education of the staff and monitoring of compliance are must. Since the 30mg vancomycin disc diffusion test often misclassifies the initially sensitive isolates as fully susceptible, microbiology laboratories must determine MICs for vancomycin and communicate the results to the treating doctors. “A stitch in time saves nine” - now is the time for appropriate action.

REFERENCES
15. Tiwari HK, Sen MR. Emergence of vancomycin resistant Staphylococcus aureus (VRSA) from a tertiary care hospital in northern part of India. BMC Infect Dis 2006; 6: 156.