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TITLE:

EMERGENCE OF MUPIROCIN RESISTANCE AMONG STAPHYLOCOCCI - A CHALLENGE TO INFECTION CONTROL & ANTIBIOTIC PRESCRIBING PRACTICE

INTRODUCTION:

Methicillin resistant staphylococcus aureus (MRSA) is an increasingly common pathogen associated with both nosocomial & community acquired infections. Colonisation of anterior nares with Staphylococcus aureus is common & provides reservoir of infection of other sites such as surgical site infection, blood stream infections & ventilator associated pneumonia.[1.]

In addition to self infection, colonised individuals are a potential MRSA reservoir for its spread. Hence, eradicating or suppressing MRSA colonisation has remained a cost effective strategy for preventing infections & transmission.[2.]

Currently most effective topical agent for eradicating nasal carriage of MRSA is Mupirocin applied to the anterior nares 2-4 times day for 5 days. Mupirocin inhibits bacterial isoleuryl tRNA synthetase, blocking the formation of isoleuryl tRNA, which in turn impairs protein synthesis.[1, 3]

Increased use of mupirocin has been accompanied by outbreaks of MRSA resistant to mupirocin. Two forms of resistance are reported

- Low level resistance with MIC of 8-256µg/l due to mutation in *ileS* gene
- High level resistance with MIC of ≥ 512 µg/l due to acquisition of the plasmid mediated *mupA* gene.[2, 3.]

Low & high level resistance has been detected in both Staphylococcus aureus & Coagulase negative staphylococci (CNS). It is possible that CNS may act as reservoir for plasmids encoding high level resistance, and that these plasmids may subsequently be transferred into isolates of Staphylococcus aureus.[3.]

These plasmids typically carry resistance determinants to other antimicrobial agents, including macrolides, gentamicin, tetracycline and trimethoprim. These findings suggest that mupirocin use could select for increased drug resistance in Staphylococcus aureus.[4.]

Therefore this study will assess the level of resistance through a cost effective & convenient method which can be easily adapted by any clinical laboratory.

OBJECTIVES:

1) To isolate and identify staphylococcus aureus and CNS from all clinical samples.
2) To determine the methicillin resistance among Staphylococci
3) To determine the mupirocin resistance among the staphylococcus aureus and CNS

METHODOLOGY:

All clinical isolates of staphylococci obtained from various samples received in clinical microbiology laboratory will be processed & indentified as Staphylococcus aureus & CNS by studying the colonial morphology, pigment production & standard biochemical tests. Disc diffusion test will be carried out to determine the MRSA by using cefoxitin 30µg disc according to CLSI guidelines and interpreted as follows:

Zone of inhibition	Interpretation
≤21mm	MRSA positive
>21mm	MRSA negative

All the staphylococcal isolates are subjected for mupirocin resistance by using disc diffusion test according CLSI guidelines. Plates containing Muller-Hinton agar are swabbed in all the directions with 0.5 McFarland inocula of staphylococcal suspension and disc containing 5µg mupirocin & 200µg mupirocin are placed. Zone of inhibition are determined after 24hrs of incubation at 35^0c and interpreted as follows.

Zone of inhibition diameter (mm)		Interpretive criteria
5µg	200µg	
>14	>14	Mupirocin sensitive
-	>14	Low level mupirocin resistance
-	-	High level mupirocin resistance

- Indicates no zone of inhibition

Antimicrobial resistance to other antibiotics like amikacin (30µg), gentamicin (30µg), Clindamycin (2µg), erythromicin (15µg), oflaxacin (5µg), chlaramphenicol (30µg), Trimethpoprim-sulfamethoxazole (25µg) are also determined by using standard disc diffusion test.

IMPLICATIONS:

Low level & high level mupirocin resistance in staphylococci is more with MRSA than MSSA. This linkage between MRSA and mupirocin resistance is cause for concern considering the role of mupirocin as a topical agent for MRSA elimination. Hence it is necessary that mupirocin should be restricted to use only within the guidelines of defined infection control protocols.

Testing for mupirocin resistance is not routine at most institutions. So there is need for baseline testing and subsequent monitoring for mupirocin resistance before implementing infection –control strategies that rely heavily on mupirocin for MRSA decolonisation.

REFERENCES:

1. Jones JC, Rogers TJ; Mupirocin resistance in patients colonised with methicillin-resistant staphylococci aureus in a surgical intensive care unit. *Clinical Infectious Diseases* (2007); 45:541-7
2. Nizamuddin S, Irfan S, Zafar A; Evaluation of prevalence of low & high level Mupirocin resistance in Methicillin Resistant Staphylococcus aureus isolates at a tertiary care hospital. *JPak Med Assoc.* (2011) 61; 6:519-21.
3. Schimtz FJ, Lindenlauf E; The prevalence of low and high level mupirocin resistance in staphyolococci from 19 European hospitals. *Journal of Antimicrobial Chemotheraphy* (1998); 42:489-95.
4. Patel JB, Gorwitz RJ, Jernigan JA; Mupirocin Resistance. *Clinical infectious Diseases* (2009); 49:935-41.