THE CARRIER STATE: METHICILLIN - RESISTANT STAPHYLOCOCCUS AUREUS A HOSPITAL STUDY "SCREENING OF HOSPITAL PERSONNEL" FOR NASAL CARRIAGE OF STAPH AUREUS

Pages with reference to book, From 35 To 38

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Abstract

Methicillin resistant Staph Aureus (MRSA) were studied in a 300 bedded Central Government Hospitat Rawalpindi, in which 291 staff members were screened by nasal swabbing. Of 1 25 cases carrying staph aureus 5 (1.78%) were methicillin resistant. They were treated with Bacitracin ointment to be applied to interior nares four times a day for one week. Hexachiorophane baths daily, chlorhexidine shampoo once daily for a week, and were taken off duty from wards for one day (JPMA 39: 35, 1989).

INTRODUCTION

In the twenty years since the introduction of antibiotics, hospital acquired infections due to staph aureus became a curse. Often the organism was resistant to penicillin and other antibiotics. Methicillm was introduced in 1959 and outbreaks due to MRSA in mid-1960's were rather uncommon[1]. This may be because of control of infection procedures, restraint in the use of antibiotics, availability of B4actamase stable penicillins and possibly a natural reduction in the virulence and transmissibility 'of staph aureus. In early 1970's, there was internationally a general decline in the incidence of MRSA and there have been only two detailed reports of Hospital outbreaks from USA[1,2]. Problems with methicillin resistant staph aureus emerged again in late half of 1970's. These MRSA, usually resistant to flumerous antibiotics including Gentamicin and Chloramphenicol, may be sensitive to Rifampicin and Fusidic acid and always sensitive to Vancomycin. Despite the early reports of Shanson et a1[3] and the occasional isolates of MRSA in U.K. in later half of 1970's the U.K. strain rarely gave rise to cross infection following standard patient isolation procedures. The extensive studies of Lid well and his colleagues demonstrated staff nasal carriage as a significant source of staphylococci for new nasal acquisition by patients and the contribution of staff nasal organism was even greater when the strain was tetracycline resistant[4,5]. Nasal carrier of staph aureus can disperse significant number of organism into the environment[6]. To control the possible transmission of MRSA from staff to patient a screening programme was carried out in 1979 to find out the incidence of nasal carriage of these organisms among staff of a Central Government Hospital.

MATERIAL AND METHODS

Members of the staff (doctors, nurses, ward boys, operation theatre staff, House Keeping) of 300 bedded Central Government Hospital, Rawalpindi were screened.

Nasal Swabbing

This method was selected due to limited time, facilities, financial support and, being easily sampled site, may be named as an indirect means of detecting staff who carry MRSA at other sites of the body[3] and chances by the transmission by nasal shedders, who are more dangerous than throat carriers, is

more if all other possibilities are eliminated by proper hospital asepsis technique. Right and left si4es of anterior nares were sampled by rubbing upto 1½ cm by sterile cotton wool swabs moistened with sterile normal saline. All swabs were inoculated within one hour of collection on relevant culture media. Specimens were processed mainly to detect carriage of staph aureus only. They were inoculated on blood agar and Mannitol salt agar and incubated at 37°C overnight, aerobically. Any staphylococcus aureus isolated was confirmed by slide and tube coagulase test, Dnase and phosphatase tests. Plates were further incubated for 24 hours and any further isolation of staph aureus looked for, other pathogenic organisms isolated were kiebsiella pneumoniae, Pseudomona aeroginosa, and Candida albicans. Sensitivity was done by stoke disc diffusion method7. Disc used for antimicrobial sensitivity testing were (ug/ml) Penicillin 2 units, Erythromycin 5 ug, Tetracycline 25 ug, Gentamicin 10 ug, Fusidic acid 10 ug, Sulphonamide 100 ug, Cotrimoxazole 25 ug, Clindamycin 2 ug, Methicillin 10 ug. Sensitivity to Vancomycin and for some strains to Gentamicin could not be done due to non-availability of Sensitivity Discs. Media used for antimicrobial susceptibility testing was Iso-sensitest agar (Oxide ltd.)

RESULTS

Two hundred and ninety one nasal swab were processed; 11 contaminated specimens excluded from the study and 281 specimens Total cases positive Ibr slap/i aureus carriage were 125 (44.5%) and total cases carrying pathogenic organisms including staph aureus were 130 (46%). No pathogens were found in 151 specimens and so they were defined as culture negative. Methicillin rdsistant staph aureus carrier staff were 5 in number. Organisms isolated in addition to staphylococcus included Kiebsiella pneumoniae in 4 cases of which one staff was carrying methicillin sensitive staph aureus (MSSA) as well, one had candida albicans, two had pseudomonas of whom one case had both pseudomonas pyocynae and staph aureus. He had deflected nasal septum which helps carriage of pseudomona spp. All these cases were suffering from symptomatic infections. These organisms were sensitive to most of the antibiotics in use and were given treatment for their symptoms. Follow up cultures could not be done.

TABLE I. Antibiotic sensitivity of Staphylococcus Aureus.

	Name of antibiotics	No Sensi-tive	No Resis-tant	% Sensi-tive	% Resis-tant
1.	Penicillin	39	86	31	69
2.	Erythromycin	112	13	90	10
3.	Tetracycline	73	52	59	41
4.	Sulphonamide	100	25	80	20
5.	Contrimoxazole	100	25	80	20
6.	Clindamycin	112	13	90	10
7.	Methicillin	120	5	96	4
8.	Fusidic acid	50	1	98	2
9.	Gentamicin	20	–	–	–

Table I shows the antibiotic sensitivity pattern of staph aureus to commonly used antibiotics. Most of the resistance of staph aureus was noted .to penicillin (69%) and tetracycline (41%). Fusidic acid sensitivity could be done for only 51 isolates (98% sensitive), gentamicin sensitivity was available to 20 isolates and none of them was resistant.

TABLE II. Screening of Personnel in Hospital for Nasal Carriage of Staph aureus.

Personnel	No cultured	Nasal cultures positive for Staph aureus			
		Methicillin Sensitive		Methicillin Resistant	
		No.	%	No	%
Physicians	57	27	47	1	1.8
Nurses	75	33	44	1	1.3
Ward Boys	54	30	55	2	3.7
House keeping	95	30	32	1	1.02

Table-II shows the details of nasal carriage of Methicilin sensitive staph aureus (MASSA) and MRSA in Hospital personnel. MRSA was carried by one physician, one nurse, two ward boys and one house keeping staff. All the 5 MRSA strains were resistant to penicillin, 4 were resistant tO tetracycline and one moderate-resistant (carried by house keeping staff), three were resistant to Suiphonamide and Septran, two to Lincomycin. Three were fully sensitive to Erythromycin and two moderate-resistant, all sensitive to Fusidic acid. Gentamicin sensitivity could not be made available to these isolates because of non-availability of discs.

DISCUSSION

In the present study Methicillin sensitive staph was 42.7% of considered population and 43% of total population. Prevalence of MRSA was 1.78% of total population. All MRSA were resistant to penicillin, and 4 to tetracycline. These were also multi-drug resistant and all resistant to more than one or two antimicrobials. In the light of studies by Lidwell et al[4,5] it was assumed that these isolates may act as important sources for transmission of infection. In study by Klimek[8] of Hospital personnel in an outbreak, out of 202 staff members, 5 personnel (2.45%) carried MRSA and total staph carriage was 20.30%. In study of Craven et al[9] overall carrier rate of staph aureus sensitive and resistant to oxacillin was 17% while our carrier rate was much higher, 44.50%. In a survey no carrier of oxacillin resistant staph aureus was found in early 1979 in Hospital personnel but in late 1979 the MRSA rate was 3.3%[9] while our rate was 1.78% which is much lower may be because of multiple factors relating to population studied. In practice, staff nasal carriage during outbreak had either a low prevalence, or was absent. 508 employees, screened at the University of Virginia Medical Centre, who had direct contact with patients and who were colonised or infected with an outbreak strain, revealed that only 2 (0.4%) who carried MRSA[10]. Scrutiny of studies by authors mentioned suggests a further reason to support the

screening of staff for nasal carriage, namely as an indirect mean of detecting staff who carry MRSA at other sites, e.g., colonised[3,9] None of staff personnel carrying MRSA had any evidence of clinical infection at other sites. We were not able to under take more extensive screening study by taking specimen from other carriage sites of body. The Hospital personnel carrying MRSA in our study were given Bacitracin ointment four times a day for both anterior nares for one week, hexac hiorophane bath and chlorhexid me gluconate shampoo daily for a week and removed from duty from wards for 24 hours. Follow up cultures could not be done. The practice of hand washing for all patient contacts before and after touching patient was strictly enforced and use of disposable gloves and rigorous no-touch dressing technique recommended. This study emphasizes the importance of identifying and possibly avoiding the introduction of a hospital staff member, carrier of MRSA into the hitherto unaffected hospital, for reducing the reservoir by the use of antiseptics for colonised sites, skin and superficial sites. This screening study helped us to identify the MRSA carrier staff who could transmit them to patients attended by them and might have caused clinical infection and sepsis.

AC ENOWLEDGEMENTS

I am thankful to Dr. Syed Mohsin Ali, then Medical Superintendent, Central Government Hospital, Rawalpindi for providing me full cooperation for collection of specimens from Central Government Hospital, Rawalpindi and Major General Syed Azhar Ahmad (then Brigadier) Commanding Officer A.F.I.P. for providing laboratory facilities.

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