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## ORIGINAL ARTICLES

### STUDIES OF SKIN COLONISATION BY STAPHYLOCOCCUS AUREUS.

#### A Preliminary report.\*

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Staphylococcal sepsis is an important problem both in general medical practice and in hospital. Difficulties are encountered in tracing possible routes by which staphylococci may spread in hospital because large numbers of people in hospital and outside hospital may carry potentially pathogenic (coagulase-positive) staphylococci. The nose is said to be the most important and most common site for carriage of *staphylococcus aureus*, but carriage sites in the skin of other parts of the body may be of importance (see Williams, Blowers, Garrod and Shooter, 1960). Colonisation of the skin of the perineum was thought by Hare and Ridley (1958) and Ridley (1959) to be of particular importance from the point of view of dispersal of dangerous staphylococci. Williams et al. (1960) pointed out that the inaccessibility of the perineum for routine swabbing presented a practical difficulty but there the relation of dispersal to skin carriage of *staph. aureus* should be more thoroughly investigated. This is certainly necessary, nasal carriage has until recently received most attention, although Hare and Ridley (1958) found no correlation between the numbers of *staph. aureus* in the nose and the degree of contamination of skin or clothing.

In addition to its important relationship with problems of crossinfection, skin colonisation or contamination by potentially dangerous staphylococci is of direct interest to the dermatologist. We are uncertain regarding the factors which determine the carrier state, and we do not understand why particular sites appear

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to be more readily colonised. These areas of skin possessing apocrine glands appear to be most favourable for *staph. aureus*.

Kandhari, Prakash and Singh (1963) commented on the lack of Indian literature on normal skin flora and observed that *staph. aureus* was present on 3 of 15 healthy individual quantitatively examined by them. Their sampling method involved scraping the skin with a sterile scalpel blade, and they investigated the skin of the scapular region as this is not constantly exposed to the external environment and was thought less likely to be transiently contaminated.

There are other recognised sampling methods to determine bacterial flora of skin. Simple dry swabbing is frequently used. The adhesive strip method involves the application of a strip of clear adhesive tape to the skin and its transfer thereafter to the surface of a plate of culture medium. The strip thus collects a sample of epithelial debris and the associated bacteria are imprinted on the culture medium where they grow to produce colonies. This gives a roughly quantitative index of contamination or colonisation. These methods have their limitations but they may be used under conditions unsuitable for more elaborate procedures such as the handwashing method of Frice (1938).

#### THE PRESENT INVESTIGATION.

A comparative study was made of staphylococcal carrier rates in two similar groups of medical students. A total of 67 subjects were intensively investigated, 34 were clinical students who had spent an average of 12 months attending the wards, and 33 were pre-clinical students with no duties in the wards. All of the subjects were male. The average age was 21.8 and 19.7 years respectively in the two groups.

A brief questionnaire was completed and six specimens were submitted for bacteriological examination from each subject. These included (i) a deep nasal swab (ii) a superficial swab of the anterior nares, (iii), (iv) a Sellotape strip and a swab from the inter scapular area (v) a perineal swab, and (vi) a throat swab. In addition a swab of any cutaneous lesion was submitted.

The deep nasal swab and the throat swab were cultured on sheep blood agar and examined after incubation for haemolytic streptococci as well as for staphylococci. The other specimens were cultured on nutrient agar and examined after 24 and 48 hours incubation at 37°C. Likely colonies were picked and tested for coagulase production using citrated rabbit plasma and the slide coagulase test. The growth of coagulase-positive staphylococci from each specimen was roughly assessed as scanty (less than 10 colonies), moderate (11 to 50 colonies) and profuse (more than 50 colonies). The sensitivity of the strains of *staph. aureus* isolated was determined for penicillin, streptomycin, tetracycline, chloramphenicol and erythromycin by the disc diffusion method.

## RESULTS

The results are summarised in Table 1

Group	Number of Isolations of Staph. Aureus From		
	Nose.	Back.	Perineum.
Clinical 34.	9 (26.47%)	12 (35.29%)	15 (44.11%)
Pre-clinical 33.	20 (60.60%)	5 (15.15%)	5 (15.15%)

Number of isolations of Staph. Aureus from different carriage sites in two groups of Medical students (Percentages in brackets).

Although selective culture techniques were not employed, yield of *staph. aureus* obtained from the positive subjects were generally moderate or profuse.

Nasal carriage was predominant in the non-clinical group (60.60%) and perineal carriage in the clinical group (44.11%). These differences are statistically highly significant ( $P < 0.01$ ). They were certainly not anticipated and merit discussion later.

Despite these high carrier rates, a cutaneous lesion was present in none of the pre-clinical subjects. Two members of the clinical group each had a small pustule in the nasal region which yielded *staph. aureus*.

It is clearly evident that nasal and perineal carriage were not correlated. Nasal and perineal carriage were combined in only 4 of the clinical group and in 2 of the pre-clinical group. However perineal carriage and skin carriage (as judged from the swabs taken from the inter scapular area) appear to be fairly well correlated.

## FENICILLIN SENSITIVITY

Table 2

GROUP	Staph. Aureus Isolated from					
	Nose		Back		Perineum	
	Total.	No. Pr or Per	Total	No.	Total	No. Pr or Per.
Clinical 34 Men.	9	7	12	10	15	12
Pre-clinical 33	20	13	5	1	5	4

Number of isolations from different carriage sites and number showing Demonstrable resistance to penicillin (Pr = Resistant, PER = Relatively resistant to penicillin) Resistance or relative resistance to penicillin is marked in strains from both groups. Of the 34 clinical students, 13 recalled having had penicillin therapeutically, 20 of the 33 pre-clinical men had received penicillin at some time.

## CHOICE OF METHOD OF SAMPLING SKIN FLORA

The swab gave more positive cultures for *staph. aureus* than the adhesive tape. In the pre-clinical group, the tape method was superior in 2 cases but the swab was

superior in 7 cases. In the clinical group, the tape was positive and swabnegation in 2 cases, whereas the swab was positive and the tape negative in 3 cases.

### DISCUSSION.

This pilot study was performed under various technical difficulties in a developing laboratory. The results must therefore be accepted with caution. However, the study was of such a design that any improvement in technique would be reflected in better isolation rates from all of the carriage sites. This quite clearly did not occur and it is unlikely that the differences found can have been due to artefact. We did not expect to find higher nasal carrier rates for *staph. aureus* in the preclinical group and, as this is an unusual finding, it seems that some factor must be operating to diminish nasal carriage in the clinical group. It is tempting to suggest that the extensive use of antibiotics in the hospital is resulting in actual suppression of nasal flora by inhaled particles of antibiotic-laden dust on the nasal epithelium. The results of our present investigation indicate that the clinical group are nevertheless heavily colonised by *staph. aureus* on the skin of the back perineum, and this suggests that strains of *staph. aureus* occurring under hospital conditions are more capable of colonising skin sites. Whether this is primarily dependent upon some factor in the staphylococcus or on some particular environmental condition of hospital is a question which requires further exploration. The answer is of importance. We have therefore now initiated an investigation involving bacteriophage typing to elucidate some of these interesting problems.

### SUMMARY.

1. A preliminary comparative study of staphylococci carrier rates in clinical & non-clinical medical students was made.
2. Nasal carriage was found to be predominant in the non-clinical group & the perineal carriage in the clinical group.
3. It is suggested that the inhaled particles of antibiotic-laden dust in the hospital, perhaps may be causing suppression of nasal staphylococcal flora in the clinical students.

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### REFERENCES

- Hare R., & Ridley, M. (1958): Brit. med. J., 1, 69.  
 Kandhari K. C., Om Prakash & Gurmohan Singh (1963): Ind. J. Der. & Ven. 29, 53. Price P. B. (1938): J. infect. D. 63, 30.  
 Ridley, M (1956): Brit. med. J. 1, 270.  
 Williams, R. E. D., Blowers R., Garrod L. P., & Shooter R. A. (1960) Hospital infection, causes and prevention, Pub:- Luke Ltd. (LONDON)