

# A survey of staphylococci isolated in hospital practice

J. BRADLEY & M. J. MEYNELL

*From the General Hospital, Birmingham*

**SYNOPSIS** In-patient and out-patient strains of coagulase-positive staphylococci were compared and showed a different phage group distribution. Group III predominated in the in-patient series and accounted for nearly all the antibiotic-resistant strains. The prevalence of phage type 80 in breast abscesses was noted. It was found that one in three coagulase-positive staphylococci isolated from hospital in-patients was sensitive to chloramphenicol and erythromycin only.

In 1948, Barber and Rozwadowska-Dowzenko drew attention to the increasing incidence of penicillin-resistant strains of *Staphylococcus aureus* isolated in hospital practice. Fairbrother (1956), examining strains from in-patients and out-patients, found penicillin sensitivity in 36% and 63% respectively. Hennessey and Miles (1958) reported a series of 248 strains of coagulase-positive staphylococci which were sent to them from East Africa, of which 40% were phage type 80; 37% were sensitive to penicillin.

### MATERIALS AND METHOD

For a period of four months, from October 1958, to January 1959, swabs were taken from every abscess, infected lesion, or wound seen in the casualty department of this hospital.

All staphylococci isolated were tested for coagulase production by the tube method of Fisk (1940). Coagulase-positive strains were phage typed by the method of Williams and Rippon (1952). Antibiotic sensitivities were determined on agar plates using Evans Sentest tablets:

|                       |                 |
|-----------------------|-----------------|
| Penicillin.....       | 2.5 i.u./tablet |
| Streptomycin .....    | 80 µg./tablet   |
| Tetracyclines .....   | 100 µg./tablet  |
| Chloramphenicol ..... | 100 µg./tablet  |
| Erythromycin.....     | 10 µg./tablet   |

In all 492 strains were examined.

For comparison, 500 strains of staphylococci from in-patients (sputa, boils, specimens of urine, wound, and nasal swabs) collected over the same period were similarly tested.

### RESULTS

Table I shows the phage group distribution of all the casualty and hospital in-patient strains. The incidence of group I strains was the same in both groups;

nevertheless, phage 80 staphylococci accounted for 10% of in-patient strains and only 4.5% of casualty strains.

**TABLE I**  
GENERAL PHAGE GROUP DISTRIBUTION

| Group  | I     | II     | III   | I+III | I+II | IV   | NT   |
|--|-------|--------|-------|-------|------|------|------|
| Phage  | 80    | Others |       |       |      |      |      |
| Casualty   | 23    | 177    | 110   | 97    | 27   | 0    | 5    |
| Cases  | 4.5%  | 36.1%  | 22.5% | 19.5% | 5.5% | 0%   | 1%   |
| In-patient   | 50    | 137    | 39    | 210   | 30   | 3    | 3    |
| Cases  | 10.0% | 27.1%  | 7.7%  | 42.0% | 6.0% | 0.6% | 0.6% |
| Group I = 29, 52, 52A, 79, 80  |       |        |       |       |      |      |      |
| Group II = 3A, 3B, 3C, 55, 71  |       |        |       |       |      |      |      |
| Group III = 6, 7, 42E, 47, 53, 54, 75, 78  |       |        |       |       |      |      |      |
| Mixed groups, <i>i.e.</i> , with lysis to phages of two groups above are classified as such. |       |        |       |       |      |      |      |
| Group IV = 42D, 187 (and miscellaneous)  |       |        |       |       |      |      |      |

Table II shows the antibiotic sensitivities of the strains isolated according to source.

**TABLE II**  
ANTIBIOTIC SENSITIVITY

|   | Casualty    | In-patient  |
|---|-------------|-------------|
| Number of strains isolated  | 492         | 500         |
| No. penicillin sensitive  | 303 (61.5%) | 117 (23.4%) |
| No. penicillin insensitive but sensitive to streptomycin and/or tetracyclines | 173 (35.3%) | 218 (43.6%) |
| No. sensitive to chloramphenicol and erythromycin only                        | 16 (3.2%)   | 154 (30.8%) |
| No. erythromycin sensitive only   | 0           | 8 (1.6%)    |
| Insensitive to all  | 0           | 3 (0.6%)    |
|   | 492 (100%)  | 500 (100%)  |

Sixty-one per cent of the casualty strains were sensitive to penicillin whereas only 21% of strains from in-patients were sensitive. Thirty per cent of

in-patient strains were sensitive only to chloramphenicol and erythromycin whereas this was so in only 3% of casualty strains.

Group III staphylococci were responsible for most of the antibiotic-resistant organisms in both casualties and in-patients. They accounted for two-thirds of strains sensitive to chloramphenicol and erythromycin only (phage type 80 made up most of the remaining third), most of strains sensitive only to erythromycin, and for all those resistant to the five antibiotics tested.

In in-patients, 1.6% were sensitive to erythromycin only and 0.6% were insensitive to all five antibiotics.

TABLE III  
PHAGE GROUPS OF CASUALTY STRAINS  
ACCORDING TO SITE

| Group                  | I  |        | II | III | I+III | IV | NT |
|------------------------|----|--------|----|-----|-------|----|----|
|                        | 80 | Others |    |     |       |    |    |
| Septic hand<br>249     | 9  | 104    | 70 | 35  | 8     | 2  | 21 |
| Breast abscess<br>18   | 4  | 5      | 4  | 2   | 3     | —  | —  |
| Axillary abscess<br>17 | —  | 7      | 1  | 4   | 3     | —  | 2  |
| Perineal abscess<br>17 | —  | 5      | 4  | 2   | 2     | —  | 4  |

Septic hand included pulp space infections, paronychia, web space infections, etc., and yielded group I in 40% of cases, of which 3.5% were phage type 80.

Eighteen cases of breast abscess were included in the survey; of these, four had phage type 80 infection. All were sent a questionnaire to find if they had

recently been delivered of a child, and if they had been admitted to a hospital or nursing home before the development of the abscess. Replies were received from 14 patients, but among the four who did not answer were two who had phage type 80 staphylococcal infection. Five of the 14, including both the patients with phage type 80 infection who replied, had recently been delivered in hospital.

TABLE IV  
ANTIBIOTIC SENSITIVITIES OF PHAGE TYPE 80  
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|            | Sensitive to:<br>Penicillin | Strepto-<br>mycin | Tetra-<br>cyclines | Chloram-<br>phenicol | Erythro-<br>mycin |
|------------|-----------------------------|-------------------|--------------------|----------------------|-------------------|
| 67 strains | 1 <sup>1</sup>              | 10                | 6                  | 65                   | 66                |

<sup>1</sup> Out of 68 strains; the penicillin-sensitive strain was not tested for sensitivity to the other antibiotics.

Although the antibiotic pattern of phage type 80 varies, the predominant one of these strains was sensitive only to chloramphenicol and erythromycin. No phage type 80 was insensitive to all the antibiotics tested.

We wish to thank Miss Ann Butcher for technical assistance, and Miss M. N. Ellis and Mrs. E. M. Bluck for typing this report.

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