

## BACTERIAL CONTAMINATION IN OPERATING THEATRES OF DISTRICT HOSPITAL BUDGAM IN KASHMIR DIVISION

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### ABSTRACT

This paper describes the presence and level of bacterial contamination in an operation theatres that contributes to the major outbreak of nosocomial infections of District Hospital Budgam of Kashmir Division. Samples were collected by open plate method and swab method for air, surface and articles, and were further isolated and identified. The bacterial pathogens comprising of *Staphylococcus spp.*, *Bacillus spp.*, and *Coagulase negative Staphylococci spp.* High bacterial contamination was observed in air samples in which 80% contamination was caused by *Bacillus spp.*

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### INTRODUCTION

Microbial contamination of hospital environment, especially in an operating theatre and other specialized units had continued to increase prevalence of nosocomial infections.<sup>1,2,3</sup> With resultant effect of high morbidity and mortality rate among patient admitted for post-operative surgery, patients in intensive care units with multi-drug resistant strains like methicillin-resistant *Staphylococcus aureus* (MRSA) show tedious control of these organisms<sup>11,14</sup>.

Leading complications of surgery includes high rate of infection among surgical sites<sup>6</sup>. Microbiological contamination of air in the operating room is generally considered to be a high risk factor for infections of surgical site in clean surgery.<sup>6,10</sup> Evaluation of the quality of air in operating theatres can be performed routinely by microbiological sampling and particle counting<sup>4,8</sup>.

Wound infection caused by *Staphylococcus aureus* acquired in the operating theatre may be prevented, in part, by improving the bacteriological quality of air during surgery. Total numbers of bacteria in an empty operating theatre should be < 35 cfu/m<sup>3</sup> with less than one colony of *Clostridium perfringens* or *S. aureus*<sup>13</sup>. During an operation, total air counts should be < 180 cfu/m<sup>3,7,13</sup>

The clinical implication of bacterial contamination in operating theatre and specialized care units had enormous effect of infection on both the patient and the caring medical team. Based on this observation, the present study is focused on to evaluate the level of bacterial contamination in operating theater of different hospitals and other specialized units of Kashmir Division.

### MATERIALS AND METHODS

**Collection and Transport of specimens:** Air and surface samples were taken from all operating theatres of a General Surgery and Gynecology Division of District Hospitals of Budgam in Kashmir Division.

**Sampling:** The evaluation of bacterial contamination in an operating theater was performed by using settle plate and swab method.

**(a) Settle plate method:** Air sampling was performed with settle plate methods. Petri dishes containing Nutrient, Blood and Mac-Conkey's agar media were transported to operation theatres in sealed plastic bags. The plates were labeled with sample number, site within theatre, time and date of sample collection. The plates were placed at three chosen places in the operation theatre at about 1 meter above the ground, and exposed for 15 minutes. After this exposure, the plates were covered with their lids and taken to laboratory in sealed plastic bags and incubated at 37° C for 24 hours.<sup>14</sup>

**(b) Swab method:** A swab soaked in nutrient broth was used to collect samples from the floor, walls, equipments, instruments, operation tables, wash basin etc. All the samples were labeled properly and immediately transported to the Microbiology Department of Public Health Laboratory (PHL) for processing.<sup>9</sup>

### PROCESSING OF SAMPLES

Swabs taken from different places were streaked on Blood and Mac-Conkey's agar plates. These culture plates along with those exposed in air were incubated at 37°C under aerobic conditions for 24 hrs. After incubation the colonies were counted and identification of isolates was performed. The concentration of airborne bacteria was expressed as colony forming units per cubic meter cube (cfu/m<sup>3</sup>).<sup>12</sup>

**RESULTS:** The results of air and surface samples were as follows: Table 1 represents the high bacterial contamination in G. Surgery ward i.e. CoNS 100%, *S. aureus* 66.66% and *Bacillus spp.* 50% whereas Gynecology ward contain the high contamination of CoNS and *S. aureus* i.e. 100% and 50% respectively with least concentration of *Bacillus spp.* (33.33%).

**Table 1:** Isolated Bacteria from Air Samples of OT's in the District Hospital Budgam

| Name of the OT's                | Total No. of samples collected | Organisms Isolated |      |               |        |                       |        |
|---------------------------------|--------------------------------|--------------------|------|---------------|--------|-----------------------|--------|
|                                 |                                | CoNS               |      | Bacillus spp. |        | Staphylococcus aureus |        |
|                                 |                                | No.                | %age | No.           | %age   | No.                   | %age   |
| <b>District Hospital Budgam</b> | 12                             | 12                 | 100% | 6             | 50%    | 8                     | 66.66% |
| 1. G. Surgery                   | 12                             | 12                 | 100% | 4             | 33.33% | 6                     | 50%    |
| 2. Gynecology                   |                                |                    |      |               |        |                       |        |

\*OT: Operation Theatre; CoNS: Coagulase Negative *Staphylococcus* spp.

**Table 2:** Isolated Bacteria from Surface/Articles of OT's in the District Hospital Budgam

| Name of the OT's                | Total No. of samples collected | Organisms Isolated |      |               |      |                       |      |
|---------------------------------|--------------------------------|--------------------|------|---------------|------|-----------------------|------|
|                                 |                                | CoNS               |      | Bacillus spp. |      | Staphylococcus aureus |      |
|                                 |                                | No.                | %age | No.           | %age | No.                   | %age |
| <b>District Hospital Budgam</b> |                                |                    |      |               |      |                       |      |
| 3. G. Surgery                   | 10                             | 3                  | 30%  | 8             | 80%  | 2                     | 20%  |
| 4. Gynecology                   | 10                             | 4                  | 40%  | 5             | 50%  | 3                     | 30%  |

\*OT: Operation Theatre; CoNS: Coagulase Negative *Staphylococcus* spp.

Table 2 indicates that G. Surgery ward surfaces contain the highest degree of contamination in which *Bacillus* spp. Percentage was high i.e 80% in reference to *Staphylococcus aureus*.

## DISCUSSION

The bacterial pathogens were isolated comprising of *Staphylococcus aureus* and coagulase negative *Staphylococci* spp., had the highest percentage of occurrence in air samples while in surface samples *Bacillus* spp. showed highest percentage of occurrence. Bacterial contamination of operating theatre had contributed significantly to high prevalence of nosocomial infections<sup>14</sup>. The resultant effect of bacterial contamination is much more pronounced in post-operative /or open wound that could occurs during dressing or contaminated air atmosphere in the operating theatre and other specialized units. Microbiological contamination of air in the operating room is generally considered to be a risk factor for surgical site infections in clean surgery.<sup>5</sup> According to Pasquarella et al<sup>10</sup> microbiological quality of air may be considered as mirror of the hygienic condition of the operation theatres. The quality of indoor air depends on external and internal sources such as ventilation, cleaning procedures, the surgical team and their activities.<sup>13</sup>

The present study aim was to assess the frequency of contamination in operating theater and to identify the organism which was involved in post operative infections. So the present study revealed that the higher bacterial contamination was found in air samples instead of surface or article sample. In air sample as well as surface sample, the maximum growth of contaminated bacteria was observed in G. Surgery ward which represent the higher risk of skin infections, boils, wound infections or abscesses.

Whereas in terms of bacteria the highest contamination was observed by coagulase negative *Staphylococci* spp. and *Staphylococcus aureus* in air and *Bacillus* spp. in surfaces this will also indicating the emergence of highly drug resistant bacteria. So the preventive measure may be achieved by making improvement in cleaning and by using disinfectants and needs periodic fumigation of these OTs.

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