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LETTER TO EDITOR

Air bacterial isolations from operation theatres in a tertiary care hospital in India

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ABSTRACT

Peroperative bacterial contamination of the wound is known to be a major risk factorfor surgical wound infection. The microbiological quality of theatre air is one of the significant parameter for controlling surgical wound infection. The present study was conducted in seven operation theatres of a tertiary care teaching hospital of capital city of India with 1000 beds for a period of one year. Settle plate method was adopted using standard sized Blood agar plates. A total of 344 samples taken repeatedly from seven different operation theatres were processed and the isolates were *Staph aureus* (16%), *Coagulase negative Staph*(26.7%), *Acinetobacter* spp.(2.03%) and *Klebsiella* spp. (0.3%). Crowding of surgical theatres by surgical staff, trainees and students is an important issue along with design, ventilation problems and overuse of theatres. This is the first Indian study conducted in order to determine air bacterial isolates in operation theatres.More studies are warranted on quality of air in operation theatres.

Introduction

Peroperative bacterial contamination of the wound is known to be a major risk factor for surgical wound infection. In order to minimize this kind of wound contamination, focusing on air bacteria released by the Operating Theatre personnel, Ultra clean laminar flow (LAF) ventilation system is introduced for use in operating rooms [1],[2],[3],[4]. Good hospital hygiene is an integral component for preventing Hospital Acquired Infections. The microbiological quality of theatre air is one of the significant parameter for controlling surgical wound infection. It has been calculated that for a procedure lasting approximately one hour, the total number of bacteria carrying particles falling in the wound is about 270 per cubic cm. The risk of infection depends on how many of these bacteria are viable at the time of wound closure, also species and virulence of the bacteria, the precise site of lodgment and integrity of patient's host defense [5].

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Material and Methods

The present study was conducted in seven operation theatres of a tertiary care teaching hospital of capital city of India with 1000 beds for a period of one year. Aim of this study was to assess the degree of contamination of the hospital operation theatres. Surfaces (floor, walls, other horizontal surfaces and all the easily accessible items) were cleaned with detergents and carbolised at least once a day. None of the operation theatres are equipped with laminar flow or any other air flow system. Settle plate method was adopted using standard sized MacKonkey's agar and Blood agar plates. Plates used were pre-incubated overnight under the conditions that matched incubation of air samples to be taken. This allowed the plates with contaminants to be discarded. Plates were placed on the floors,

Operation theatre tables and other horizontal surfaces and were exposed for one hour. Various sites chosen in the operation theatres were operating rooms, scrubbing room, autoclaving room and recovery room. After exposure of one hour that allows sufficient time for settling of particles in natural and efficient manner, plates were incubated in the incubator overnight at 37^0C. Next day colonies were counted and the representative colonies from each plate were picked up and confirmed by colonial morphology, Gram's staining and biochemical reactions [2]. Staph aureus isolates were tested for antibiotic susceptibility according to standard procedures by Kirby Bauer method on Mueller Hinton agar.

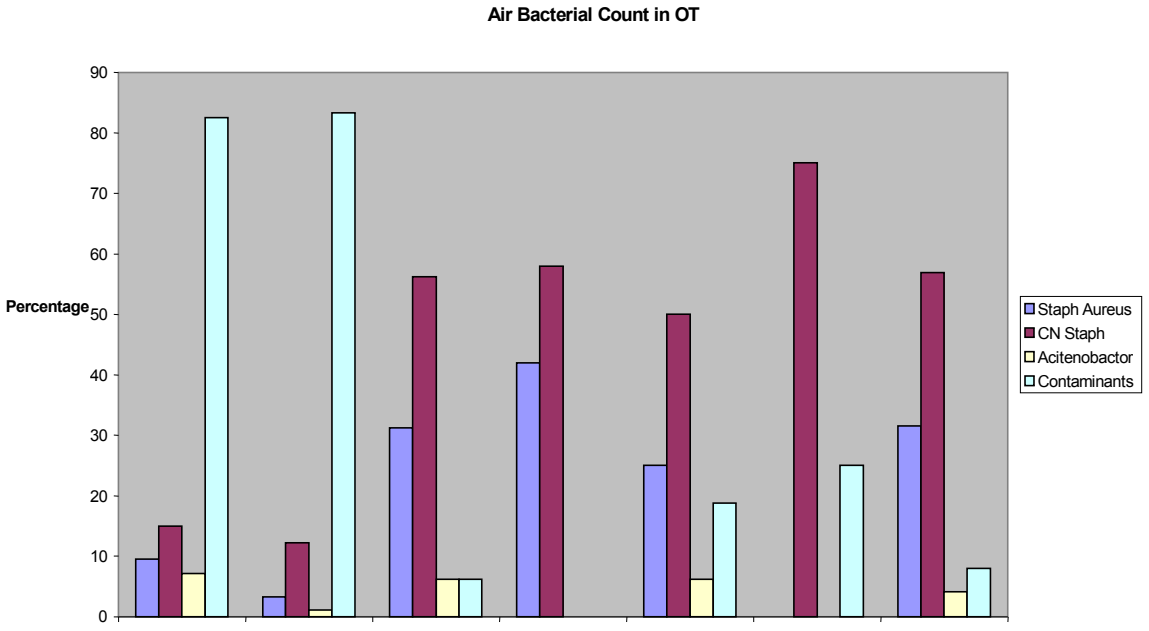
Results and Discussion

A total of 344 samples taken repeatedly from seven different operation theatres were processed and the isolates were *Staph aureus* (16%), *Coagulase negative Staph*(26.7%), *Acinetobacter* spp.(2.03%) and *Klebsiella* spp. (0.3%) . Term 'contaminants' is used for isolates other than pathogens (see Graph).

No attempt was made to record the number of people entering the rooms. The greatest effect on number is movement and presence of the patient and theatre staff in the theatre. Bacterial species identified were mostly *Coagulase negative Staphylococci* which is similar to another report [6].

Nasopharyngeal shedding from person participating in the operation can be the source of these airborne contaminants [7]. Also, microscopic skin fragments are given off by the staff in theatres. These fragments get contaminated with micro colonies of bacteria resident or perhaps present on the individual's skin. Whilst individuals will have different dispersion levels, overall dispersion is increased with movement and number of individuals present [8],[9]. *Staph aureus* were mostly sensitive to most of the commonly used antibiotics (tetracycline,erythromycin,cephalexin,gentamicin, ciprofloxacin, ofloxacin, oxacillin,vancomycin, cefuroxime etc).Gram positive bacteria could be detected significantly and frequently as compared to Gram negative bacteria which are less often isolated from the environment. Crowding of surgical theatres by surgical staff, trainees and students is an important issue along with design, ventilation problems and overuse of theatres. Though settle plate method may be regarded as crude measure of airborne contamination but does provide a simple and cost effective way of enumerating the contamination rate of horizontal surfaces at multiple points. The results indicate exclusion from operation theatres of those with skin conditions at least in ultra clean surgery.

Table/Fig 1



Slit samplers allows sampling over a short time period comparatively and hence indicates the occurrence of individual events like influx of excess personnel and unnecessarily opening the door. These events are lost while using settle plates since sampling is done for comparatively longer time periods. There are no standardized methods available in the country for air sampling in Operation Theatres or for its frequency and also no report on the prevalence of types of bacteria is available. At present, there is no international consensus on the methods, types of samples (settle plate versus volumetric air sampling) frequencies of sampling and tolerable limits of bioburden in Operation Theatres. This is the first Indian study conducted in order to determine air bacterial isolates in operation theatres.

Conflict of Interest: None declared

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