OPERATION THEATRE ASEPSIS

Deepali Danave¹

¹Assistant Professor, Department of Microbiology, Dr. V. M. Government Medical College, Solapur, Maharashtra.

ABSTRACT

BACKGROUND AND OBJECTIVES
Nosocomial infections occur worldwide and affect both developed and resource poor countries. Exogenous sources of surgical site infections (SSIs) include the operating room environment, the personnel and equipment. Our study has analyzed the role of fumigation in operation theatres (OTs) as a means to reduce SSIs.

MATERIALS AND METHODS
The study was conducted in a tertiary care institute from Jan- March 2009. Post fumigation 313 samples were obtained from health care centres and incubated anaerobically for growth of anaerobes in Robertson’s cooked meat medium (RCM). 41 positive samples (15.07%) were isolated which had growth of Gram positive spore bearers suggestive of Clostridia. Various sites were shadow less lamp (12), instrument trolley (9), OT table (6), suction machine (6), microscope (2), sterilizer (2), Boyle’s machine (2), autoclave (1) and wall (1).

CONCLUSION
A large proportion of health care associated infections (HCAI) are preventable. In resource poor settings operation theatre asepsis and hygiene practices play a crucial role in reduction of SSIs.

KEYWORDS
Health Care Associated Infections (HCAI), Operation Theatre Fumigation, Spore Bearers.

INTRODUCTION
Nosocomial infections occur world-wide and affect both developed and resource poor countries. Infections acquired in health care settings are among the major causes of death and increased morbidity among hospitalized patients. Surgical site infections (SSIs) are the second to third most common site of health care associated infections (HCAIs). For SSIs the initial introduction of microbial pathogens occurs most often during the surgical procedure performed in the Operating Theatre (OT). Exogenous sources of SSI pathogens include surgical personnel, the operating room environment (including air) and all tools, instruments and materials brought to the sterile field during an operation.

The modern era has evolved in the practices of sterilization and disinfection which is one of the variables to control SSIs.

Our study has analyzed the role of maintaining sterile OTs by fumigation in order to reduce the burden of infectious pathogens thereby helping in the decline of SSIs.

MATERIALS AND METHODS
The study was conducted in Dept. of Microbiology from a tertiary care teaching hospital during Jan- March 2009 and analyzed thereafter.

313 samples were obtained from operation theatres of 41 centres which included primary health centres (PHC), rural hospitals (RH), sub-district hospitals, ESI hospitals, family planning centres, private hospitals and our tertiary care hospital. All these OTs were fumigated with formaldehyde disinfectant and then closed down for 24 hours. Post 24 hours samples were obtained using sterile cotton swabs from various sites. These were OT tables, instrument trolleys, suction machines, shadow less lamps, autoclaves, Boyle’s machines, sterilizers, microscopes. The samples were inoculated in Robertson’s cooked meat media (RCM) and transported to the laboratory. RCM bottles were incubated for 48 hours to 5 days before discarding them. After 48 hours of incubation smears were done daily using Gram stain. Presumptive identification of spore – bearing organisms was done and then reported.

RESULTS
A total of 313 samples were cultured anaerobically of which 41 samples (15.07%) were positive for spore bearing organisms suggestive of Clostridial species. Maximum growth of spore bearers was seen from shadowless lamp (29.26%) followed by instrument trolley (21.95%), suction machine and OT table (14.63% each). Microscope, sterilizer, Boyle’s machine (4.87% each) and autoclave (2.43%) were considerably lower in number for growth of spore bearers. One sample (2.43%) obtained from wall was also positive but it was not given any relevance.
were an estimated 157,000 surgical site infections associated with inpatient surgeries. A recent prevalence study found that the most common healthcare-associated infection, accounting for 31% of all HAIs among hospitalized patients. [7] The CDC healthcare-associated infection (HAI) prevalence survey found that there were an estimated 57,500 surgical site infections associated with inpatient surgeries in 2011. [8]

In addition to increased morbidity and mortality, these infections contribute significantly to the financial burden borne by patients, their families and the healthcare system. The increasing incidence of SSIs as antimicrobial resistant bacteria further complicates the issue.

Our study has tried to investigate OT room environment, tools and instruments as possible sources of HCAI. Aldehyde compounds as formaldehyde used for fumigation are of considerable importance. Presence of residual organisms post fumigation is indicative of either improper technique or inadequate use of disinfectants. We isolated Gram positive spores bearers suggestive of Clostridial species from various locations and equipment. They were predominantly shadowless lamp (29.26%), instrument trolley (21.95%), OT table and suction machine (14.63%) each. These can contribute significantly towards aetiology of SSIs as they are in direct contact or vicinity of patient. Other tools as microscope, sterilizer, Boyle’s machine (4.87% each) can also be indirect contributors. One positive sample obtained from wall (2.43%) was considered irrelevant. These OTs were advised to undergo - fumigation and operate only after sterility check. In case of contaminants isolated only surface disinfection was advised. Various studies have implicated the role of bio-burden on OT tables, equipment as causative factors of SSIs. [9,10]

While advances have been made in infection control practices, including improved operating room ventilation, sterilization methods, barriers, surgical technique and availability of antimicrobial prophylaxis, SSIs remain a substantial cause of morbidity, prolonged hospitalization, and death. SSI is associated with a mortality rate of 3% and 75% of SSIs associated deaths are directly attributable to the SSI. [11] Surveillance of SSI with feedback of appropriate data to surgeons has been shown to be an important component of strategies to reduce SSI risk. [12-14] Although the risk of acquiring SSIs exists worldwide the risk and impact are likely to be higher in resource constrained settings where compliance with standard recommendations for infection prevention and control are generally not optimal. In this scenario good OT practices such as OT fumigation, maintaining equipment sterility are determined efforts towards prevention and reduction of HCAIs.

### DISCUSSION

Estimates indicate that hundreds of millions of patients suffer from health care associated infections (HCAI) each year worldwide. [4-6] The most common HCAs are urinary tract, surgical site, lower respiratory tract and bloodstream infections. Bacteria are the most common nosocomial pathogens. Pathogenic bacteria have greater virulence and cause infections (sporadic or epidemic) regardless of host status. The common culprits are anaerobic Gram positive rods (Clostridium), Gram positive bacteria (Staphylococcus) and Gram negative bacteria (Enterobacteriaceae, Pseudomonas). Health care environment and equipment sustain considerable flora responsible for HCAI. A recent prevalence study found that SSIs were the most common healthcare-associated infection, accounting for 31% of all HAIs among hospitalized patients. [7] The CDC healthcare-associated infection (HAI) prevalence survey found that there were an estimated 57,500 surgical site infections associated with inpatient surgeries in 2011. [8]

In addition to increased morbidity and mortality these infections contribute significantly to the financial burden borne by patients, their families and the healthcare system. The increasing incidence of SSIs as antimicrobial resistant bacteria further complicates the issue.

Our study has tried to investigate OT room environment, tools and instruments as possible sources of HCAI. Aldehyde compounds as formaldehyde used for fumigation are of considerable importance. Presence of residual organisms post fumigation is indicative of either improper technique or inadequate use of disinfectants. We isolated Gram positive spores bearers suggestive of Clostridial species from various locations and equipment. They were predominantly shadowless lamp (29.26%), instrument trolley (21.95%), OT table and suction machine (14.63%) each. These can contribute significantly towards aetiology of SSIs as they are in direct contact or vicinity of patient. Other tools as microscope, sterilizer, Boyle’s machine (4.87% each) can also be indirect contributors. One positive sample obtained from wall (2.43%) was considered irrelevant. These OTs were advised to undergo - fumigation and operate only after sterility check. In case of contaminants isolated only surface disinfection was advised. Various studies have implicated the role of bio-burden on OT tables, equipment as causative factors of SSIs. [9,10]

While advances have been made in infection control practices, including improved operating room ventilation, sterilization methods, barriers, surgical technique and availability of antimicrobial prophylaxis, SSIs remain a substantial cause of morbidity, prolonged hospitalization, and death. SSI is associated with a mortality rate of 3% and 75% of SSIs associated deaths are directly attributable to the SSI. [11] Surveillance of SSI with feedback of appropriate data to surgeons has been shown to be an important component of strategies to reduce SSI risk. [12-14] Although the risk of acquiring SSIs exists worldwide the risk and impact are likely to be higher in resource constrained settings where compliance with standard recommendations for infection prevention and control are generally not optimal. In this scenario good OT practices such as OT fumigation, maintaining equipment sterility are determined efforts towards prevention and reduction of HCAIs.

### REFERENCES

9. Aline Mesquita Amaral; Augusto Diogo Filhó; Mileide Maria de Assunção Sousa III; Patrícia Araújo Barbosa IV; Paulo Pinto Gontijo Filho V. The importance of protecting surgical instrument tables from intraoperative contamination in clean surgeries. Available from www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-...


11. Mu, Y., et al., "Improving risk-adjusted measures of surgical site infection for the national healthcare safety network". Infection Control Hospital Epidemiology, 32(10); (2011): 970-86.


14. Consensus paper on the surveillance of surgical wound infections. The Society for Hospital Epidemiology of America; the Association for Practitioners in Infection Control; the Centers for Disease Control; The Surgical Infection Society. Infection Control Hospital Epidemiology, 13(10); (1992): 599-605.
