A STUDY OF METHODS USED FOR DISINFECTION OF ANAESTHETIC EQUIPMENT BETWEEN TWO SURGICAL OPERATIONS AT A LARGE TEACHING HOSPITAL

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ABSTRACT

A prospective study on the growth of bacteria on certain commonly used anaesthetic equipment was undertaken in a large teaching hospital with a view to assess the effectiveness of disinfection/sterilization procedures. Samples for microbiological assessment were drawn by the worker using standardised procedures and tested in the laboratory by a microbiologist, blinded to the type of sample. Criteria for growth positivity was taken as > 25 colony forming units. A total of 90 observations were taken. 30 each for 'before use', 'after use' and 'after disinfection'. Overall 54.6% of the equipment showed growth "before use" with maximum growth being seen in Suction catheters (66.6%) and Guedal airways (60.0%). On the other hand, the proportion of equipment showing growth "after use" was quite high (84.6%), with suction catheters and endotracheal tubes showing 90.0% growth each. There was significant difference as regards "before" and "after" use growth on Endotracheal tubes, Guedel airways and Face masks ($p < 0.05$). Analysis of growth "after" disinfection" revealed that the probability of growth remains as high as 70% in suction catheters (95% CI=54% to 86%) and 60% in laryngoscopes (95% CI=43% to 78%). The study revealed gross inadequacies in methods of disinfection being followed at present.

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KEYWORDS: Anaesthetic equipment; Disinfection.

INTRODUCTION

As early as in 1873 Dr Skinner raised provocative questions about infection control practices of anaesthesiologists [1]. Joseph reported several cases of follicular tonsillitis due to transfer of microbes from patient to patient by inefficiently sanitized anaesthetic equipment [2]. There remains considerable divergence of opinion as regards to the degree of sterility of anaesthetic equipment required in between two surgical procedures and methods to be adopted for disinfection/sterilization [3]. Conclusive evidence exists that equipment get heavily contaminated during use. Meeks and coworkers cultured face masks "after use" and demonstrated pathogens like *Staph.epidermidis*, *Staph. aureus* and *Pseudomonas Spp* from 73%, 10% and 36% of face masks respectively [4]. Increase in availability of single use disposable items of anaesthetic equipment like endotracheal tubes, airways and their reuse by anaesthesiologist, at times without proper disinfection between two consecutive surgical operations, warrants a major reappraisal of procedures for cleaning and disin-

fection being used.

MATERIAL AND METHODS

The study was conducted at two centrally air conditioned operating rooms of a 1052 bedded hospital w.e.f. 24 April 96 to 24 August 96. Five semi-critical equipment, viz, laryngoscopes, endotracheal tubes, Guedel airway, face masks and suction catheters were studied. Samples for microbiological assessment were drawn from each equipment at three stages that is, "before use", "after use" and "after disinfection". All culture samples were collected on randomly scheduled days. Samples for culture were obtained by Swab rinse techniques using Brain Heart Infusion Broth (BHIB) media [5]. These were subsequently plated on blood agar and reported positive if growth of > 25 colony forming unit (cfu) was seen. Growth of < 25 cfu was reported as No Growth (NG). Microbiologists were blinded to the type of samples which were coded before being sent to microbiology department. A total of 90 observations were taken for each equipment, 30 each for "before use", "after use" and "after disinfection". The methods being used for disinfection /decontamination procedures were recorded by direct observations.

Results were analysed by McNemar's analysis of "paired" samples [6].

Results

The disinfection/decontamination procedures being used for semi-critical anaesthetic equipment, as recorded by direct observa-

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tions are given in Table 1. The result of positive culture reports on samples "before use", "after use" and "after disinfection" on equipment studied are given in Fig. 1. The result of culture reports on "before use" samples showed an overall 54.6% of contamination of equipment (82 out of total 150 culture reports were positive). The maximum growth being seen in suction catheters (66.6%) and Guedel airways (60%). "After use" culture samples showed growth, too numerous to count in 73.3% of laryngoscopes, 90% of endotracheal tubes, 86.6% of Guedel airways, 83.3% of face masks and 90% of suction catheters.

TABLE 1

Observed procedures of disinfection/decontamination of anaesthetic equipment, in between two surgical operation

Equipment	Procedure of disinfection/decontamination followed	Remarks
Laryngoscope	Wiped off with gauze piece after withdrawing it, sometimes wiped off with spirit swab, not autoclaved or chemically disinfected, dried and kept for re-use.	Personal laryngoscopes are used by individual anaesthetists. Kept on trolley without cleaning.
ET Tubes	ET tubes are thoroughly rinsed with soap water and swabbed dry and then spirit/savlon swabs are used and dried.	PVC tubes which are disposable are being re-used without sterilisation.
Guedel airway	Not put to any routine process of disinfection excepting usual anaesthetist practice of cleaning after withdrawing or at times cleaned with spirit if visibly dirty.	Outer surface found to be damaged
Face mask	Cleaned with savlon/spirit swab by operating room assistants after use.	Not routinely disinfected. Cleaned only when found dirty. Surface found damaged
Suction catheters	Kept dipped in savlon solution over night. Solution changed every week. Rinsed in between use depending on anaesthetist's style of practice who may not clean after withdrawal.	Keeps on frequently falling off from bottle on to the floor. Non adherence to change schedule of savlon solution was noticed.

The results of culture reports on all the equipment studied are summarised in Table 2. McNemar's analysis for "paired" samples was carried out between results of "before use" and "after use" culture samples for each equipment. The results of statistical analysis revealed no significant difference between "before use" and "after use" culture positivity as regards laryngoscopes and

Fig. 1 : Presence of bacterial growth on equipment samples.

TABLE 2

Analysis of results of 'before use' and 'after use' culture reports on sample from equipments

Equipment	Before use		After use		McNemar's odds ratio (95% of CI)	P value
	Growth present	No growth	Growth present	No growth		
Laryngoscope	16	14	22	8	2 (0.73 - 5.28)	> 0.05
Endotracheal tubes	14	16	27	3	McNemar $\chi^2 = 13$ (df = 1)	< 0.05
Guedel airways	18	12	26	4	3.66 (1.12 - 11.92)	< 0.05
Face masks	14	16	25	5	6.5 (1.78 - 23.64)	< 0.05
Suction catheters	20	10	27	3	3.33 (1.01 - 11.22)	> 0.05

suction catheters ($p > 0.05$). There was significant difference as regards "before" and "after" use growth in endotracheal tubes, Guedel airways and face masks ($p < 0.05$). The proportions of bacterial growth on equipment "after disinfection" were also analysed statistically (95% CI of P calculated where P = Growth positivity %). The analysis revealed that with present methods of disinfection being followed, the probability of growth remains as high as 70% in suction catheters (95% CI=54% to 86%) and 60% in laryngoscopes (95% CI=43% to 78%).

DISCUSSION

The results of study indicate that disinfection/decontamination procedures being used for anaesthesia equipment, in both operating rooms were found to be grossly inadequate. Our study findings are in accordance with western studies as far as inadequacy of anaesthetist's observance of aseptic technique is concerned. [4,7]. Rosenberg, an anaesthesiologist, bluntly stated "The data suggest that anaesthesia personnel are aware of their potential infectious environment but do not implement protective measures for themselves or for their patients [8]. A suitable high level of disinfection/sterilisation procedures for all semi-critical equipment is required to be adopted as recommended by various anaesthesiologist associations [3,4]. Negligence resulting from lack of evidence of cross infection due to bad anaesthesia practice should not be al-

lowed to be condoned.

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