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Audit on operating theatres in Sri Lanka

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Abstract

Design and behavior within a theatre is important in preventing infections at surgical sites. Protocols exist for theatre infection control starting from the design stage. Compliance of theatres in the Sri Lankan public health sector to such recommendations was assessed in this audit in a questionnaire based descriptive study conducted in relation to a theatre infection control workshop.

Design, location, layout, ventilation and personal management in the theatres were assessed. Sri Lankan theaters fall below the recognized standards in both theatre design and infection control practices and much needs to be improved to bring up the standards of the theatres in the system to internationally acceptable norms.

Introduction

The design of operating theatres has evolved in complexity over the past decades with the development of the surgical field. However, the basic principals of theatre design remain the same. Convenience, cost and infection control are some factors that are considered in designing and planning new theatres.[1,2]

The design and behavior of staff inside operating theatres are both important factors that contribute to the development of surgical site infections (SSI).[1,3,4]

Guidelines on theatre design and policies on infection control in theatres have existed for many years now and most countries have adopted them as regular practice.[5,6] Just as theatre design, the emphasis on infection control has also changed over the years with the emergence of new technologies such as positive pressure and laminar air flow.[3]

Sri Lanka has no national policy on infection control; however the Sri Lanka College of Microbiologists with the Ministry of Health Care and Nutrition has been

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successful in establishing Infection Control Units in hospitals and also published a Manual on Infection Control, which includes a section on operating theatres, which was however published after the study was conducted.[7] The awareness of theatre staff on such guidelines and adherence to it has not been assessed. The objective of this study was to assess the compliance of Sri Lankan theatres with international recommendations on theatre design and infection control.

Methodology

The Sri Lanka College of Microbiologists in collaboration with the Hospital Infection Society of United Kingdom conducted a workshop on infection control in operating theatres in September 2004. As a part of this workshop, data on design and practices in theatres in relation to infection control were collected by using a validated questionnaire. The questionnaire requested for details on the design of theatres, ventilation, maintenance, cleaning and personnel management and was prepared according to international guidelines. They were sent by post to all hospitals with functional operating theatres with the approval of the Ministry of Healthcare and Nutrition. The questionnaires were completed by the sister or nursing officer in charge of the theatre. Responses were clarified at a workshop organized for the responding theatre sisters and nurses as a part of the collaboration mentioned earlier.

Results

Questionnaires were sent to 53 hospitals and there were 40 responses from 39 different hospitals in the hospital hierarchy of Sri Lanka (Table I). One hospital sent two replies for two different theatres at different localities within the premises.

There was no uniformity among the types of theatres; some housed only general surgical theatre units whereas others were multipurpose theatres with more than one type of surgery being performed in different rooms within the theatre. Certain hospitals had different theatre suites located within the hospital at different localities but had filled the questionnaire for only one such suite.

Design and build of the operation theatres

The design and build of the operating theatres varied (Table II) and when analyzing the actual plans of the theatres brought to the workshop by the Theatre Sisters or nurses who were involved in the study, it was noted that there was no uniformity in the actual layout of rooms or dimensions of space within the theatre suites.

Of the theatres that had no access to ICU or CSSD facilities one hospital each did not have these two units in the hospital premises at all.

The floor materials of the theatres were mostly terrazzo (22), ceramic tiles (5) or a combination of the two (6). Three theatres had carpet floors.

Ventilation systems

Thirty seven theatres (92.5 %) were air conditioned. Eleven hospitals had ventilation systems available. Of the forty theatres participating in the study only 4 had air changes but commissioning and regular maintenance programmes were in place only in 3 theatres.

The doors of the theatres were reported not to be closed in 13 (32.5%) of the theatres.

Cleaning of the operating theatres

The cleaning protocols varied with the theatres (Table III).

Both disinfectants and detergents are used in the cleaning of most of the theatres (25), only detergents are used in 7 hospitals while in 5 hospitals only disinfectants are used.

Spill management policies were available only in 26 (65%) of the hospitals. Junior staff had no formal training on cleaning in 17 (52.5%) hospitals. In some hospitals it was mentioned that either the theatre sister or a nursing officer gives verbal instructions on cleaning.

Personnel

The number of people present within a theatre room varied from 6 - 35 during on going surgery and a complete change of clothes were required in 32 (80%) of the theatres.

Discussion

Surgical Site Infections (SSI) are a major cause for post operative morbidity and results in additional expenditure to the health authorities. Though they are mainly of endogenous origin, theatre personnel and environment also contribute to SSI.[3] Thus, the infection control team needs to be involved from the planning stage itself as the architects, engineers and administers lack expertise in these areas.[1, 8] Though infection control as a concept has a considerable history in the world, the history of it in Sri Lanka is relatively short. Hospital based clinical microbiology itself has a relatively short history in the Sri Lankan health system. Thus, it is unlikely that infection control teams were involved in the design of the majority of existing theatres in Sri Lanka and lapses in the design were anticipated.

The current audit found out that 80% of the theatres involved in the study are purpose built and 35% of theatres are housed in renovated buildings. This discrepancy may be explained by the fact that although the theatre rooms themselves are built on purpose, existing building may have been modified to create them, leading to some misunderstanding of the question.

Infection control is only one aspect that needs to be considered in designing new theatres. Easy access to X ray facilities, CSSDs, ICUs, the accident and emergency unit and surgical wards also needs to be considered.[1] This is important in increasing the efficiency of theatre function and indirectly to control infections. In our study the accessibility of these units from theatres were not satisfactory. Some hospitals do not have CSSDs and ICUs within the hospital premises whilst others do not have them within an easily accessible distance. Some theatres still clean their instruments within the suite itself and the linen are washed by paid dhobis (traditional laundrymen) and then sterilized in the theatres.

Currently the trend is for multiple theatres to be housed in the same building as a theatre suite and certain facilities such as CSSD or scrub rooms to be developed as common ones.[2, 9]

From an infection control point of view it is recommended that theatres are located in a separate area of the hospitals and away from busy corridors.[1] In our study it was found that 22 (55%) hospitals have their theatres located in separate areas in the hospitals but 19 (47.1%) theatres had their main entrances opening to heavily used corridors. The latter demonstrates lack of proper planning in theatre design and establishment.

Thirty (75%) hospitals have horizontal surfaces in their walls which promotes deposition of dust. Guidelines recommend that such surfaces are minimized or where impossible, to have them slanted to facilitate cleaning.[1]

Recommendations suggest that floors have an easily cleaned, non slip material that can withstand the impact of trolleys and heavy equipment.[1]

The majority of the theatres in the study have their floors either tiled or covered with terrazzo, which is in keeping with the recommendations.

Twenty three (57.5%) hospitals have self sealing doors. However 13 (32.5%) theatres did not keep the doors shut during an operation. In and out traffic of personnel during surgical procedures promote air turbulence which facilitate the spread of airborne infection. In addition, frequent opening and closing of the doors are distracting to the surgical team as well.[3,4,6]

Table I: Responding Hospitals

Type of hospitals	Number
National	01
Specialized	05
Teaching	06
General	08
Base	17
District	02
Total	39

Table II: Design and layout of the theatres

Area assessed	Yes	No	Not responded
Purpose built theatres	32 (80%)	5 (12.5%)	3 (7.5%)
Housed in renovated buildings	14 (35%)	24 (60%)	2 (5%)
Part of a theatre suite	20 (50%)	12 (30%)	8 20%)
Different theatres are found in different			
places in the hospital	15 (37.5%)	24(60%)	1 (2.5%)
Theatre located in a separate area of the hospital	22 (55%)	17 (42.5%)	1 (2.5%)
Situated off a heavily used corridor	19 (47.1%)	18 (45%)	3 (7.5%)
Easy access to X ray facilities	09 (22.5%)	29 (72.5%)	2 (5%)
Easy access to CSSD (Central Sterilization and supplies division)	13 (32.5%)	26 (65%)	1 (2.5%)
Easy access to ICU	20 (50%)	19 (47.5%)	1 (2.5%)
Adequate storage facilities are available	12 (30%)	26 (65%)	2 (5%)
Storage facilities are available within the theatres	20 (50%)	17 (42.5%)	3 (7.5%)
Self sealing doors are available	23 (57.5%)	16 (40%)	1 (2.5%)
Walls have horizontal surfaces	30 (75%)	6 (15%)	4 (10%)

Thirty seven theatres (92.5 %%) were air conditioned; air conditioning is mainly for operator comfort and is not important in maintaining air quality. However, as discomfort of the operator hinders surgical technique, air conditioning is part and parcel of theatre ventilation.[5]

The main function of a theatre ventilator system is to prevent micro organisms from depositing on clean surgical wounds and causing SSIs.[3] Only 11 theatres participating in the study were equipped with ventilator systems, but the frequency of air changes was erratic. Regular maintenance of air conditioners too was not in practice. They were looked into only if there was detectable change in temperature.

The concept of pre use commissioning of a theatre prior to use or after a major modification[8,10] that would affect the airflow pattern of the theatre, is virtually non existent according to the current study.

Table III: Summary of cleaning procedures

Cleaning programme	Number
Once daily	5
Twice daily	17
After each theatre list	3
After each case	6
Once daily and after each case	2
Twice daily and after each case	4
No response	3
Total	40

Though the complete cleaning protocols for cleaning of theatre equipment was not analyzed as a part of the study, it is obvious that there is no uniformity in the theatre cleaning protocols. Detailed guidelines are easily accessible and freely available and the Hand Book on infection control published by the Sri Lanka College of Microbiologists also includes these.[7] It is mandatory that spill decontamination protocols are available at the theatres. The sanitary staff members who do the actual cleaning work needs to be given organized, structured training on managing these procedures. As evident from the study, there is a lack of such programmes in the Sri Lankan theatre system. The number of people within a theatre at a given time influences the microbial load in the theatre and thus influences the SSI rate. Unnecessary movements and conversations during a procedure further increase the chance of dispersion of organisms.[1,3,4,5] There is no restriction to the number of people within a theatre in most theatres in our study. This area needs to be looked at closely, especially at institutions that function as teaching units for undergraduate and postgraduate medical and nursing centres.

It is obvious from this study that there is much room for improvement in the Sri Lankan theatre system, as the majority do not conform to the international recommendations. As complete refurbishments or building of new theatres is not practical, the available facilities need to be used in such a way that the rate of infections is kept to the minimum possible level. The data in this study is 4 years old, more theatres have come up during this time and some renovated, but the involvement of infection control teams in designing these is questionable. A follow-up study to assess the change in the infection control practices within these four years is needed. Private sector hospitals that have come up in the recent past also need to be included in this study. Officials need to be informed about the importance of involving infection control teams from the initial designing of a theatre to the day to day practices.

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