A STUDY ON THE EFFICIENCY OF CSSD AT A HEALTH CARE CENTRE

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ABSTRACT

Central Sterile Supply Department (CSSD) is one of the important supportive services in the hospital which ensures infection free atmosphere. It receives, stores, sterilizes and distributes, instruments and equipments to all departments within the hospital.¹

The risk of transferring infection from instruments and equipment is dependent on the presence of microorganisms, the number and virulence of these organisms, type of procedure that is going to be performed (invasive or non-invasive), body site where the instrument or equipment will be used (penetrating the mucosal or skin tissue or used on intact skin). Hence any instrument or equipment entering into a sterile part of the body must be sterilized.

KEYWORDS: Central Sterile Supply Department (CSSD), Receives, Stores, Sterilizes and Distributes, Instruments and Equipments

INTRODUCTION

Aims

- To study quality of sterilized material supplied to various areas of the hospital.
- To analyse the turn around time of procedures in CSSD

Objectives of the Study

- To maintain record of effectiveness of cleaning, disinfection and sterilization process by physical and biological controls
- To monitor and enforce controls necessary to prevent cross infection according to infection control policy
- To assess the effectiveness of sterilisation methods and turn-around time by questionnaire method among healthcare workers / end users of the CSSD products

Significance of Study

CSSD is established to make reliably sterilized articles available at the required time and place for any agreed purpose in the hospital as economically as possible. Operating theatre accounts for major part in the budget of any healthcare institution. Hence it is worth investing in the resources and streamline the processes in the support service departments like CSSD which is required to ensure efficient functioning of Operating theatre.
Thus, data management and information system in CSSD, used for single tracking of instruments, permits fast and regular overview of productivity and quality indicators for the sterilization process, facilitating the management of CSSD. It provides more transparent data ensuring the reliability of the entire process and patient safety.

It works in collaboration with the Infection Control Committee and other hospital programmes to develop and monitor policies on cleaning and decontamination of: reusable equipment, contaminated equipment including wrapping procedures, according to the type of sterilization and sterilization conditions (e.g. temperature, duration, pressure, humidity).

Efficiency of the sterilization process totally depends on the results shown by the chemical and biological indicators incorporated during the process of sterilisation.\(^{(I)}\)

The CSSD layout should be designed for a unidirectional flow. The CSSD should have four zones for a smooth workflow.\(^{(III)}\)

- The unclean and washing area
- The assembly and packing area
- The sterilization area
- The sterile area

**The Layout**

- Entrance lobby
- Reception and Cleaning room
- Glove room
- Work room (Preparation and assembling of packs)
- Sterilisation room
- Sterile store room
- Nurses/Managers room
- Staff changing room

Organisational structure of CSSD includes a responsible technical supervisor managing the unit who works in liaison with infection control team of hospital, OT in-charge and nurse in-charge of clinical departments.\(^{(IV, V, III)}\)

Functional flow of activities in CSSD are as follows:

- Rinsing: Rinsing of articles is not permitted in patient care area. It has to be performed immediately at the source by a trained staff in the wash area next to the procedure room for patients
- Cleaning: All reusable medical devices are cleaned thoroughly prior to disinfection or sterilization.
- Drying: All articles should be dried appropriately.
• Inspection and assembly: Each item is inspected for functionality defects, breakages and then appropriately assembled.
• Packing: Articles should be packed in porous material.
• Labelling: Each pack is labelled with contents of the pack, Name initials, signature and date, Name of the person who sterilized it and date of packing on the cover of the pack.
• Sterilization: A document is maintained with details of the instruments sterilized with date, time, duration of sterilization with controls and its results. For reliability and validity of sterilization instrument a document regarding an annual maintenance is maintained.
• Storage area: A separate storage area for sterile and non-sterile sets are maintained.
• Distribution: Clean and dirty utility is segregated and sorted for further processing accordingly.
• Inventory of supplies and equipments are documented along with details of purchase and its maintenance with expiry date.

There are five major types of hazards in the healthcare workplace: biological, chemical, physical, physiological, and social. (VI)

Methodology Used

A study among a selected group of health care providers and monitoring of CSSD shall be carried out during a period of three months in the year 2014 at A.J. Institute of Medical Sciences and Research Centre, Kuntikana, Mangalore. This study was undertaken to estimate the problems encountered by the end users of the processed CSSD material and their knowledge on the processes in CSSD.

Monitoring of CSSD is essential to oversee the use of different methods using physical, chemical, and bacteriological indicators to monitor the sterilization process and ensure technical maintenance of the equipment according to national standards and manufacturer’s recommendations. Each sterilization cycle gives the print out of temperature and pressure under which the cycle is processed. Any defect regarding the administration, maintenance of instruments, lapses in infection control are recorded.

Data Collection Method

Based on a point prevalence study, a questionnaire was framed as shown in Annexure 1 with a set of questions on knowledge of processes within CSSD and problems with the outcome of the CSSD processed material with respect to quality and turn-around time. Some of these questions have forced options and some are open ended questions for the respondents to freely express their opinion regarding CSSD.

RESULTS

In the present study approximately 50% of the end users were from critical areas like Intensive care unit and Operation theatre nurses who regularly come in contact with the supplies received from CSSD. The distribution of the staff is as shown in table 1. All the nurses who were included in the study dealt with materials from CSSD on regular basis, majority of them from first shift as shown in table 2.
Seventy eight percent of the nurses believed that after instrument use the cleaning of the instruments was entirely the responsibility of the staff appointed in CSSD. Thus only 22% of the nursing staff felt the need of Cleaning instruments at the source as mandatory. Only 30% of the nursing staff were aware of the reasons for cleaning the instruments at source. Few reasons mentioned were removal of blood clot and debris which will get dried up and may be difficult to remove later. None were aware that this could contribute to hospital acquired infection.

Cycle of sterilization of instruments were efficient and hence only in one instance there was recall of sets which was observed due to change in colour of the biological indicator by the CSSD personnel. It was reported to the Hospital Infection control team and sets were withdrawn. Hence with good infection control protocol and policies in place, none of the end users have ever received any unsterile sets.

All the nurses who participated in the survey were aware that Biological indicators are used for the sterilization process. However, none of them were familiar with the names nor knew how, when and which Biological indicator was used for which process of sterilization.

Interactions with CSSD staff revealed that the main concern was human resources, lack of communication regarding the turn-around time at CSSD. The time schedule for processing of equipments after returned to CSSD was not conveyed of displayed in other areas of the hospital. After observing this deficiency, it was recommended to display the time schedule at every OT counter, ICU, Wards and OPD’s.

Operation theatre scheduling is a major contributing factor to enhance the efficiency of operating theatres. Accurate and real time scheduling assist in predicting staffing needs, ensuring availability of required equipment and supplies and thus contributing to smooth functioning of operation theatre. Schedules need to be rearranged according to agreed on principles among all surgeons, on condition that guidelines are developed to define elective versus non-elective cases.

The real time schedule depends on the number of surgeries and procedures posted in a day with starting and ending time with a margin of cases which could be emergency in the list. This allows proper allocation of resources and avoids confusion.

Delay in the surgeries is reflected by analysing the turn over time. The turn over time describes the time delay between the first and the second surgery and is measured by calculating the time the first case leaves an operating theatre on that day schedule to the time the second patient enters the same theatre. The impact of this delay is reflected on the all the consecutive surgeries posted for that day.

Elective surgeries are those where patient condition will not be affected as a result of delaying the surgery for a minimum of 48 hours. Developing policies to streamline scheduling procedures is stressed upon. Thus one needs to assess the patient’s medical condition, evaluate patient waiting time, impact on OT efficiency and consider factors contributing to patient safety to classify surgeries as elective, non-elective and emergency and propose guidelines to be implemented.

Due to lack of co-ordination and lack of communication majority of the problems occurred during emergency situations as shown in table 5.
DISCUSSIONS

Every step in CSSD has a direct impact on infection control, patient care and safety. Therefore lack of quality can have dramatic consequences on the health and safety of personnel patients\(^\text{xii}\). To maintain a good workflow, sterilization process implies proper functioning and co-ordination between four zones: Dirty area which is called washing area, assembly area/ packing area, sterile area and storing area for sterile goods.

Without proper point of use care, effective decontamination and subsequent sterilization though not impossible, is more challenging and time consuming. When blood and other body fluids, bits of tissue are allowed to dry on the surface of an instrument, the proteins tend to coagulate and create a barrier along with micro-organisms forming a biofilm. Biofilm is an accumulated mass of bacteria and extracellular material that is tightly adhered to a surface and cannot be easily removed. Since it is difficult to remove and it can further reduce the efficacy of sterilization by preventing access of sterilant into the micro-organism contaminated device. Therefore it is important that used medical devices are promptly cleaned at patient source to minimize the opportunity of biofilm formation and then sent to CSSD for further processing\(^\text{xii}\).

Body fluids tend to be high in chloride content, which is extremely corrosive to stainless steel, considerably more when allowed to dry and concentrate on the surface of the device. Those instruments which are kept piled up prior to decontamination are more prone to damage. Sorting out before assembling contributes to further delay in processing of materials. Care by end-users are explicitly recommended by professional organizations\(^{19,20}\).

CONCLUSIONS

CSSD is an independent department with facilities to receive, clean, pack, disinfect, sterilizes, store and distribute instruments as per well-delineated protocols. Thus it provides all the departments of a hospital with guaranteed sterile equipment ready and available for immediate use in patient care – a step towards the prevention of hospital acquired infections (HAI’s).

Implementation of this technology can reduce loss of surgical instruments, reduce instrument damage and reduce repair costs, automate many tedious training and reporting tasks and reduce the cost spent on investigations for infection control issues.\(^\text{xiii}\) This change of process with technology is not something for organizations to merely strive for, but rather the core of every decision resulting in a dramatic success for organization.

The problems faced by the end users with regards to CSSD are all common- missing instruments, trays, infection control issues, lack of training, monitoring reporting leading to delay in surgeries, procedures. Along with issues like requirement of adequate staff, regular training, better communication between departments is must to streamline the process and make it tailor made for individual departments.

Fixing the process is the only solution along with advance technology which identifies the process as per the planning and design that is incorporated in the computer system.

To bring about continuous improvement and update procedures one needs to recommend tools like end user satisfaction questionnaires and Infection control team audit and feedback. End users need to be trained and make them aware of the techniques used. All the reusable medical devices must be decontaminated following each episode of use.
CSSD at several hospitals have evolved with a technology which has the ability to track instruments from procurement throughout their entire cycle – of assembly, sterilization, storage, selection and its use in operating room, decontamination, back to inspection and assembly.

This technology has to be adopted which addresses the needs of the problems plaguing the CSSD in hospitals today.

REFERENCES


Table 1

<table>
<thead>
<tr>
<th>Distribution of Staff</th>
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<tbody>
<tr>
<td>ICU Nursing staff</td>
<td>32</td>
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<tr>
<td>OT Nursing staff</td>
<td>21</td>
</tr>
<tr>
<td>Medical ward nurse</td>
<td>20</td>
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<td>Surgical ward nurse</td>
<td>15</td>
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<td>OPD Nurse</td>
<td>12</td>
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Table 2

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<thead>
<tr>
<th>Working shift</th>
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<tbody>
<tr>
<td>First shift</td>
<td>68</td>
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<tr>
<td>Second shift</td>
<td>20</td>
</tr>
<tr>
<td>Third shift</td>
<td>12</td>
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Table 3

<table>
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<th>Problems Encountered</th>
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<tr>
<td>Out of stock</td>
<td>2</td>
</tr>
<tr>
<td>Non availability</td>
<td>1</td>
</tr>
<tr>
<td>Materials are in process of sterilisation</td>
<td>23</td>
</tr>
<tr>
<td>Materials not sent to CSSD</td>
<td>3</td>
</tr>
<tr>
<td>Materials borrowed from other department</td>
<td>10</td>
</tr>
<tr>
<td>Materials not received</td>
<td>2</td>
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Table 4

<table>
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<tr>
<th>Frequency of Problems Faced Due to Material Supply from CSSD</th>
<th></th>
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<tbody>
<tr>
<td>Once a day</td>
<td>3</td>
</tr>
<tr>
<td>Once a week</td>
<td>22</td>
</tr>
<tr>
<td>Once in 15 days(fortnight)</td>
<td>10</td>
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<tr>
<td>Once a month</td>
<td>6</td>
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Table 5

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<tr>
<th>Situations When Problems Occurred</th>
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<tr>
<td>During emergency</td>
<td>31</td>
</tr>
<tr>
<td>During elective surgeries</td>
<td>2</td>
</tr>
<tr>
<td>During OPD/ ward procedures</td>
<td>8</td>
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Table 3 and 4 shows lack of co-ordination and communication between CSSD and end users resulting in frequent inadequate supply of materials during surgeries or procedures.

Figure 1: Describes the Number of Deficiencies in Supply Items
Annexure 1

Questionnaire

Sample survey of efficiency of CSSD

1. Which of the following best describes your occupation/work area? (Tick one.)
   - ICU Nursing staff
   - OT nursing staff
   - Central supply staff
   - Medical ward nursing staff
   - Other staff, please specify-

2. Do you deal with materials from CSSD?
   - No
   - Yes

3. Are patient items cleaned after patient use in your area?
   - No
   - Yes

4. Do you feel cleaning instruments at source is necessary?
   - No
   - Yes
   If yes why?
   If No why?

5. How often does it happen that for any given item, you are out of stock/non availability of materials/borrowing from others/materials are in process of sterilisation in CSSD/materials not sent to CSSD/not received yet?
   Mention the reason:
   Frequency:
   once a day / once a week / once in 15 days (fortnight) / once a month

6. Which shift do you usually face problems of non-availability of materials from CSSD?
   - 1st
   - 2nd
   - 3rd

7. What problems do you face on receiving the pack?
   - Damaged / broken
   - Missing
   - Inadequate material
   - Not clean, please specify
   - Any other reason, please specify or explain the above

8. Is the above said problem noticed only during emergency or elective operation/procedure?

9. Did you receive any set unsterile(without change in indicator strip on the pack), however biological control is used in every cycle of sterilisation of instruments?
10. Name the biological indicator used for sterilisation process & mention the need?
Figure 8: Heal sealer

Figure 9: Steam Sterilization

Figure 10: Plasma Gas Sterilization (STERRAD) - Automated Chemical (Low Temperature) Systems

Figure 11: Ethylene Oxide Gas Sterilization

Figure 12