



Hospital Sterilization services

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Abstract

Central sterilization services department (CSSD) has an important role in reducing the incidence of hospital acquired infections by providing sterile instruments, equipment and surgical consumables for invasive procedures. Good sterilization practices provided by the CSSD improve patient safety and quality of health care. Theatre sterilization services department (TSSU) is sterilization services within the Operation- theatre complex and ensures a faster turnaround time and minimal delay in providing sterile supplies to the operation theatre. CSSD is divided into three zones based on the level of contamination and these zones are color coded. Movement of items is mandatorily unidirectional from clean to sterile zone.

Keywords: CSSD, TSSU, hot air oven, steam sterilizer, autoclave, sterilization, disinfection

Introduction

Central sterilization services department (CSSD) is where medical and surgical supplies and equipment are cleaned, sterilized, stored and issued for patient care. The role of CSSD is pivotal in reducing the hospital acquired infections [1]. Sterilization of equipment, instruments and surgical consumables prevent spread of pathogenic microbial organisms that harm the patient by causing infections during invasive procedures [2]. The sterile items are meant for single use and once unpacked, even if not used; it should be resent to CSSD for sterilization.

History

During the second world war, British Army established a CSSD in Cairo. The first CSSD was established in the United States in 1945. In India, Safdarjung hospital, New Delhi started its CSSD in 1960. Good sterilization and packaging practices provided by the CSSD directly influence the quality of health care and improve patient safety [3].

TSSU

Theatre sterilization services department (TSSU) is sterilization services within the Operation- theatre complex and allows quick supply of sterile items to the operation theatre. It focuses exclusively on surgical instruments and items required for operating rooms. It ensures a faster

turnaround time and minimal delay [4]. TSSU may act as a back-up for CSSD in case of equipment failure, staff shortage or high volume demand. CSSD provides sterilization services to the whole hospital including labour room, ICU, HDU and wards whilst TSSU caters to the specific and immediate needs of the operation theatres.

Location

CSSD is generally located on ground floor away from the patient traffic and well connected to surgical units through small lifts called 'dumb waiters' dedicated to supplying sterile items including instruments, linen and dressings. The equipment and furniture in CSSD is usually made of stainless steel so that the surfaces can be easily cleaned and disinfected.

Zoning

CSSD is divided into three zones based on the level of contamination namely dirt, clean and sterile zones [5]. They are color coded as red, blue and green respectively. The dirty zone receives soiled items from various departments through a receiving window. The washing, disinfection and sterilization is carried out in the clean zone and the sterile items are stored in the sterile zone and issued through a separate issue window. Sterilizers these days have double door system wherein movement of items is mandatorily unidirectional from clean to sterile zone [6].

Workflow

The steps of sterilization include receiving of used items, cleaning, drying, packing, assembling of sterile sets, sterilization, storage and distribution to various departments. Cleaning is done using water, enzymatic detergents, mechanical cleaners and ultrasonic cleaners. Mechanical cleaning may be done by rubbing and scrubbing with a brush or with the help of water under pressure. Use of air guns to clean the lumens of equipment and instruments is done. Water droplets interfere with sterilization, hence items are wiped or air dried before being packed. Linen or Spunbond meltblown spunbond (SMS) paper is used as packing material as it allows steam, ETO and hydrogen peroxide to penetrate the package and at the same time acts as a barrier against microbial contamination. Assembling involves putting together instruments, dressing items and surgical consumables as per the surgical procedure namely laparoscopy set, craniotomy set. Sterilization involves destroying all microbes and spores. An item is technically sterile if the sterilization procedure kills 99.99% of bacterial spores. Storage ensures availability of at least 5 times the average daily requirement. 1 and half times of daily requirement are calculated to be in use, 1 and half times need to be in the CSSD, 1 time is under process and 1 time be kept as reserve. Different distribution methods are followed by CSSD which include one for one exchange, milk round system, groceries system and clean for dirty exchange system.

Methods

The sterilization method is based on the heat tolerating capacity of the item. High temperature sterilization includes steam sterilization or autoclaving [7] which is the most efficient and economical method of sterilization. Steam sterilizers are available as 250 litres and 550 litres capacity. In normal sterilization, the temperature period is 121 degrees celcius for 20 minutes at 15 lb whereas in rapid sterilization, 140 degrees celcius temperature is attained for 15 minutes at 20 lb pressure. This is followed by a dry time of about 30 minutes. One complete sterilization cycle is 50-60 minutes. Bowie dick test is used for quality control of steam sterilizers and checks removal of air from sterilizer during sterilization. A uniform dark black color on the indicator paper indicates a successful test. Hot air oven uses dry heat sterilization for items like anhydrous powder, Vaseline, oils and the temperature attained is 180 degrees celcius for about 30 minutes. Heat labile items like catheters, endoscopes and tubings are cold sterilized using Ethylene oxide (ETO), ozone, bleach, glutaraldehyde, formaldehyde, hydrogen peroxide, gas plasma, gamma rays.

Fire safety:

Fire safety is of great importance in CSSD as there is equipment with heavy electrical installation working at high temperatures and pressure. ETO gas is also inflammable and explosive. CSSD must have proper fire exit signages and escape routes should be kept clear at all times. Functional status of smoke detectors, fire extinguishers and sprinkler systems should be periodically checked and electrical connections of appropriate wattage and wiring should be ensured to avoid electrical short circuits.

Pest control:

Pests include termites, cockroaches, lizards, snakes and rodents which compromise sterility and may damage electrical wirings. Food particles attract pests, hence consumption or storage of food items in CSSD should be strictly prohibited.

Conclusion

Central sterilization services department (CSSD) is where surgical instruments are cleaned, sterilized, stored and issued for patient care. The role of CSSD is pivotal in reducing the hospital acquired infections. The sterilization method is based on the heat tolerating capacity of the item. High temperature sterilization includes steam sterilization or autoclaving and Hot air oven which uses dry heat sterilization for items. Heat labile items like catheters, endoscopes and tubings are cold sterilized using Ethylene oxide (ETO), ozone, bleach, glutaraldehyde, formaldehyde, hydrogen peroxide, gas plasma, gamma rays. Fire safety is of great importance in CSSD as there is equipment with heavy electrical installation working at high temperatures and pressure. Pests compromise sterility and may damage electrical wirings. Food particles attract pests, hence consumption or storage of food items in CSSD should be strictly prohibited to maintain high standards of sterility.

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