Health and safety hazards to workers

In Mauritius, we have five regional hospitals namely: SSRNH, Victoria Hospital, Nehru Hospital, Jeetoo Hospital and Flacq Hospital and other small specialised hospitals such as ENT Hospital, Moka Eye Hospital and Brown Sequard Hospital. Each regional hospital consists of a CSSD unit respectively which cater for the provision of sterile items to the hospital and to health centres which falls under the catchment area of that regional hospital. Although, the CSSD is a small unit in that hospital, its presence and service is of great importance to the healthcare staff, patients and to the public in general. The role of the CSSD is to prevent cross- infection and contamination of the patients, staff and visitors by sterilising all equipment and instruments which aid in providing the best care to the patients.

It is time to think about the health and safety of the workers of Central Sterile Supply Department (CSSD). In order to protect and to prevent the staff of the CSSD from injuries and illnesses, it is important to identify the health and safety hazards that are present at each level and in each area of the CSSD. After identification of these hazards is carried out, appropriate preventive measures must be adopted if not to eliminate the hazards completely, but at least to minimise the exposure of the staff to these hazards so that they can work in a safer environment free from injuries, accidents and occupational diseases.

For the purpose of this project, the Hazard Identification was carried out at the CSSD of SSRN Hospital.

Abbreviations

CSSD – Central Sterile Supplies Department

SSRNH – Sir Seewoosagur Ramgoolam National Hospital

PPE – Personal Protective Equipment

EtO – Ethylene Oxide

HIV -Human Immunodeficiency Virus

OSHA 2005 -Occupational Health and Safety 2005-

HBV – Hepatitis B Virus

MSD – Musculoskeletal Disorders

1. 0 INTRODUCTION

Hospitals are such places where people get treatment for their illnesses, injuries and diseases. Many of these diseases are caused by biological agents such as bacteria, viruses and fungi. Thus, in hospitals there is high incidence of disease-causing micro-organisms which can spread from patient to patient or from patient to health care personnel or from the equipment and other materials that are used while giving care to the patients. It is the duty of the staff not only to cure the diseases of the patients but at the same time to prevent the transmission of diseases from one person to another. An effective measure to prevent spreading of the diseases is in making sure that all the items that are used in the care of the patients are sterile. Many of the instruments and materials used in the hospitals are quite expensive and are so designed that they can be reused.

The importance of a CSSD in a hospital is to provide sterile items at the required time and place in the hospital. The CSSD of a hospital receives

stores, sterilises and distributes to all the departments including the wards, outpatient department and other special unit such as the operation theatre. The main duty of the CSSD is the sterilisation of items such as catheters, tubings, surgical instruments, treatment trays and sets and dressings materials. Although, CSSD aims at providing sterile items so as to prevent the spread of infection and in some ways to protect hospital staff and patients from biological hazards, the CSSD itself is prone to various hazards. So, to be able to identify the health and safety hazards that workers face, we must first know the activities that are carried out in the CSSD.

2. 0 The objectives of the CSSD:

To provide sterile gauze packs cotton wool and equipment to all units of the hospital and to Area Health Centers, and Community Health Centers within the catchment area of a regional hospital.

To ensure that proper cleaning, disinfecting and sterilising process of items is being carried out in the department.

To keep an inventory of all supplies and equipment.

To meet the demand of its customers, i. e. different units in supplying the needed amount of sterile items to them.

To contribute to a great extent in preventing cross-infection by effective running of the department.

To take some of the work of the nursing staff so that they can give more time to the patients.

To make expensive equipment which are not used so often reusable.

To provide a safe working environment for the staff.

3. 0 The organisational structure of the CSSD at SSRNH:

The CSSD has manpower of 26 workers: 1 Superintendent, 2 Supervisors, 17 CSSD Assistants and 6 CSSD Attendants.

The Head of the Department is the Superintendent and is the one who liaises with other heads of different departments.

The supervisors are responsible for monitoring the duties of the assistants and to ensure the smooth running of the unit. They are also responsible for the effective delivery of sterile items to the required units.

The CSSD Assistants are those workers who perform most of the duties in the unit.

The attendants are mainly concerned with manual handling, collecting and delivering items to other departments of the hospital.

An organisational chart is as below:

CSSD Superintendent

CSSD Supervisors

CSSD Assistants

CSSD Attendants

4. 0 CSSD Design

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5. 0 The Sterile Supply Cycle

6. 0 The different areas of the CSSD

The CSSD is divided into four major areas:

Sorting and Decontamination

Assembly and Packaging

Sterilising

Sterile Storage and Distribution

1. Sorting and Decontamination Area:

Here the instruments are cleaned and washed. For the purpose of cleaning and washing, chemical detergents and disinfectants such as javel, alcohol and soaps are used. The instruments are washed in basin using plenty amount of water. It is only after this process that the instruments are safe to be handled. Also, sorting of instruments is carried out, disassembling of the instruments is done when needed and the CSSD assistants inspect the items for cleanliness and damage.

2. Assembly and Packaging Area:

Following decontamination, the items are further sorted, reassembled and packaged. Here, reusable linens such as surgical gowns, green sheets drapes are packed in individual special wrapping paper. Cotton wool rolls are place in carton boxes. Gauze pieces are cut into smaller sizes and are wrapped individually. Clean instruments are placed in trays (either small or large depending on the surgical intervention during which they are going to be used) and are then packed in double wrapping papers. Autoclave tapes are

used to hold the surgical items packed for sterilisation intact. These tapes have white indicator lines which turn to black lines after sterilization, thus helping the user to make sure that the pack is sterile.

3. The Sterilising Area

Here the packed items then undergo a process known as sterilization. This involves the killing of any potential pathogen on the items. Normally, several methods of sterilisation exit but steam and ethylene oxide sterilization are most commonly used.

4. Sterile Storage and Distribution Area

The sterile items are then stored in the storage area arranged neatly on different shelves. From there, the sterile items are then distributed to respective units.

7. 0 The Sterilising Process:

The CSSD attendants collect used instruments and equipment, empty carton boxes for cotton wool and the CSSD book (in which the head of the unit jots down the number of each sterile items he needs) from respective units of the hospital.

With the introduction of new technologies, old methods of sterilisation such as boiling and vaporization have been replaced by two main methods of sterilization namely:

1. Autoclaving, i. e. steam sterilisation

2. Gas sterilisation using ethylene oxide.

The items that are sterilised in the CSSD are:

Cloth, i. e. green sheets drapes

Gauze

Cotton wool

Instruments

Pre-sterilisation

Prior to sterilisation, all the items must be prepared through a process known as pre-sterilisation.

The pre-sterilisation process for the items that have to be sterilised is as follows:

1. Cloth

The clean linen are folded, and then wrapped in a special paper. The packed linen is then sealed with autoclaves tape.

2. Gauze

The gauze are cut into uniform pieces and made into either large gauze or small gauze. They are then packed in paper into individual packs and are sealed with autoclave tapes.

3. Cotton wool

The cotton wool is made into small rolls from large bundles and placed in small carton boxes which are then sealed on the sides with autoclave tapes.

4. Instruments

The instruments are first checked for soil, they are then washed and placed in trays or individual sets depending on the requisition of the respective unit. They are then packed in double special paper wrappers and sealed with autoclave tapes.

Sterilisation

It is a process used to make a medium free from micro-organisms including bacterial spores. Sterilisation can be done through heat, chemicals, irradiation and high pressure.

In the CSSD at SSRNH, two types of sterilisation is being used:

Gas Sterilisation

Steam Sterilisation

Gas Sterilisation

Using ethylene oxide. This method of sterilization can be used to sterilise those items that can withstand temperatures of 50-60ËšC. A long period of aeration is required to remove all traces of ethylene oxide.

Autoclaving, i. e. Steam Sterilisation

It is the most reliable process of sterilization. It sterilises with steam under pressure. The high pressure also ensures saturation of wrapped surgical packs. Autoclaving is one of the most effective methods for destruction of all types of micro-organisms. The amount of time and degree of temperature necessary for sterilisation depend on the articles to be sterilised.

8. 0 LITERATURE REVIEW

The aims of Occupational Health and Safety are:

To promote and maintain a high degree of physical, mental and social well-being of workers in their respective workplace;

To prevent adverse effects on the health of the workers that can be due to the working conditions;

To protect the workers at their workplace from risks resulting from factors adverse to health;

To provide the workers with such working environment that suits their physical and mental needs;

the adaptation of work to humans.

We can thus say that occupational health and safety englobes the social, mental and physical well-being of workers. A healthy workplace means a safe workplace where the workers will be in an environment where the hazards exposure is quite minimised if not eliminated completely.

Occupational health and safety is important as:

Work plays a major role in people’s lives, since most workers spend at least eight hours a day in the workplace. Therefore, work environments should be safe and healthy. But, this is not the case for many workers. Every day workers all over the world face many health hazards, such as:

dusts

gases

noise

vibration

extreme temperatures.

As a result of the hazards and a lack of attention given to health and safety, work-related accidents and diseases are common in all parts of the world.

Appropriate and effective workplace health and safety programmes can help to protect the workers by reducing hazards and their consequences. Health and safety programmes can also have positive effects on both worker morale and productivity and can thus be beneficial to the organisation. At the same time, effective programmes can save employers a great deal of money.

There are many hazards that might exist in any workplace such as:

chemical hazards in the form of liquids, solids, dusts, fumes, vapours and gases;

physical hazards, such as noise, vibration, unsatisfactory lighting, radiation and extreme temperatures;

biological hazards, such as bacteria, viruses and fungi;

psychological hazard as a result of stress and strain;

hazards related to the non-application of ergonomic principles, like badly designed machinery, mechanical devices and tools that will be used by

workers, improper seating and workstation design, or poorly designed work practices.

Workers often get work-related health problems and do not realise that the problems are related to their work, particularly when an occupational disease, for example, is in the early stages. Besides the other more obvious benefits of training, such as skills development, hazard recognition, etc., a comprehensive training programme in each workplace will help workers to:

recognise early signs/symptoms of any potential occupational diseases before they become permanent conditions;

assess their work environment;

insist that management to make changes before hazardous conditions can develop.

Previous research on CSSD shows that:

According to Linda Clement, “ Items processed in the decontamination areas are potentially pathogenic and pose a potential exposure risk to employees working in these areas”. She also stated that to prevent cross contamination, good infection prevention processes must be put into practice. Also, the housekeeping procedures should be the same as those that are used in operation theatre and delivering rooms and that all horizontal working surfaces and the floors should be cleaned daily. The medical equipment poses a risk of exposure to blood and bodily soils, and other safety hazards before or during processing. So, appropriate personal protective equipment (PPE) should be worn by the workers, they should adopt good work practices

and have to follow the manufacturer’s instructions. “ Whether it is a sterilizer, a washer/disinfector, an endoscope or a surgical instrument, it is best to follow the device manufacturer’s instructions found in operator manuals and other product documentation for handling, operation, cleaning and disinfecting medical equipment”.

As per John Brown, “ All personnel working in the decontamination area should wear clean, facility-provided uniforms that are donned at the facility”. Also, workers should use general purpose utility gloves, gown, a surgical face mask and goggles while working in the decontamination area. During maintenance procedures, additional PPE is necessary including eye protection and steel-toed shoes should be worn at all times to protect from sharp and heavy objects from causing injury to workers’ feet. Leather gloves while handling potentially sharp objects, stainless steel panels and plumbing piping gloves and heat-resistant arm sleeves must be worn while working around steam piping and face shield when using cleaning chemicals.

(Infection Control Today-Jennifer Schraag April 08)

8. 1 HEALTH AND SAFETY HAZARDS:

8. 1. 1 Safety

The primary areas of potential hazards include environmental, electrical, mechanical, chemical, biological, fire and physical. The work performed in the CSSD need special attention to avoid injury to the workers and sometimes visitors such as nursing staff. Most workplace injuries and accidents are caused by neglect, carelessness or lack of understanding of

the principles of safety. Safety is every worker’s responsibility so as protects oneself and also the equipment in the CSSD which is government’s property.

8. 1. 2 Chemical Hazard

These hazards are present when a worker is exposed to any chemicals in the workplace, be it solid, liquid or gas. Some of these chemicals are safer than others, but some workers who are sensitive to chemicals, even those that are commonly used solutions can cause illness, skin irritation or breathing problems.

In the decontamination area, the use of chemicals for cleaning purposes is necessary. These chemicals are caustic soda, javel, methyl spirit, soaps and detergents. Exposure may result when the workers do not use necessary personal protective equipment (PPE) while handling these hazardous chemicals found in soaps, disinfectors and cleaners.

Exposure to these substances can cause contact dermatitis, excoriation of the skin and ulcers. Prolonged and persistent exposure may end up in allergic reactions or hypersensitivity.

8. 1. 3Ethylene Oxide (EtO) Hazards

EtO possesses several physical and health hazards that really need much attention. EtO is a liquid below 51. 7Ëš F, or a gas that has ether-like odour at concentrations above 700 parts per million (ppm) and is both flammable and highly reactive. The current OSHA Permissible Exposure Limit (PEL) to EtO is 1ppm for an 8-hour time weighted average.

Normally, EtO sterilization is done for items which cannot be exposed to steam sterilization. Exposure hazards normally results from improper ventilation in ethylene oxide chamber after the sterilising process, during off-gassing of sterilized items or due to leakage from pipe connection. Hazards can also occur when removing sterilized items from the sterilizer or even when changing bottles of EtO gas.

Health effects of EtO are:

Eye irritation and injury to cornea, frostbite and on prolonged skin exposure, severe irritation and blistering of the skin can happen.

Gastric irritation and injury to the liver can result from accidental ingestion of EtO.

Inhalation of EtO vapours may cause respiratory irritation and lung injury, headache, nausea, vomiting, diarrhea, shortness of breath and cyanosis.

Risk of cancer, adverse reproductive effects and chromosomal damage can result from prolonged exposure to EtO.

8. 1. 4 Biological Hazard

In the decontamination area, workers may be injured from contaminated sharp instruments such as needles and scalpels, while sorting, cleaning and washing. Soiled, reusable instruments are considered to be contaminated with bacteria and other micro-organisms, which can cause illness to the staff. Exposure to infected material can cause diseases such as Viral Hepatitis and HIV. Contamination is liable to occur due to presence of blood borne pathogens found in soiled drapes and pointed objects, e. g needles. Hepatitis

B is transmitted through contact with the blood or body fluid of an infected person on soiled drapes or surgical instruments which in turn land up in the CSSD for sterilisation.

8. 1. 5 Ergonomics related hazards

When the physical requirements of a job and the physical capacity of a worker do not match, it can cause in work-related Musculoskeletal Disorders (MSD). Ergonomic hazards occur when the type of work, body position and working conditions put strain on the body. A worker will not notice the strain immediately . For short-term exposure, a worker can get “ sore muscles” the next day or in the days following exposure, but long term exposure can end in serious long-term injuries. These hazards may be due to:

bad lighting

not properly adjusted workstations and chairs

frequent lifting

bad posture

repetitive awkward movements

too much force is needed to do a work and it has to be done quite often.

In the CSSD, workers are exposed to repetitiveness of works, prolonged standing and reaching out while sorting instruments, uncomfortable sitting postures on chairs which are non-ergonomically designed during trimming of gauze and putting cotton wool rolls in boxes. The workers have to bend frequently while lifting heavy loads, need to reach high storage shelves or

need to push or pull heavy carts loaded with sterile or unsterile items, all this can lead to MSD. Contact trauma to forearm can also occur if the workers the wrists are placed on hard surfaces.

8. 1. 6 Physical Hazards

These are the most common and can be present in most workplaces at anytime. They include unsafe conditions that can cause injury, illness and death. Sometimes bad working practices are used so often that they become the routine works habits and might be not considered as hazards to workers. But still these hazards cannot be accepted in a workplace.

Physical hazards include:

electrical hazards

constant loud noise

high exposure to heat

slips/trips and falls.

Burns and cuts

Workers are exposed to burns and cuts during handling of hot sterilised items or sharp instruments when removing them from autoclaves.

Slips/Trips/Falls

Exposure to slippery floors can occur to spills of detergents and presence of water on the floors while cleaning and washing of instruments is being done in the decontamination area. In the sterilizing area because of the use of

steam in autoclaving processes, the environment inside the room will be humid and may cause the floor to be slippery.

Electrical Hazards

All electrical devices should be inspected upon arrival in the CSSD. Improper grounding and earthing facilities can prove to be dangerous. Regular maintenance and repairs of the equipment in the CSSD should be documented and proper records should be maintained. Electrical cords lying on the floors can cause workers to trip over them and the cords can also be exposed to wet floors and cause electrocution. The use of extension cords should be avoided and electrical sockets should not be installed next to washing basins or near any source of water. Unsafe electrical installations by incompetent persons can give rise to electrical hazards. All electrical installations should have protective devices such as circuit breakers, fuses, Residual Current Devices so that the electrical equipment are safe from overvoltage and excessive current. Unsafe work practices can lead to electrical accidents.

Heat

Exposure to hot environment can lead to heat stress, heat exhaustion, and cramps. This can happen when workers are unloading items once autoclaving is completed. As autoclaving uses steam, the atmosphere in the sterilising area becomes very moist and the temperature in that unit is quite raised when the autoclaves are in operation. The workers feel very hot and also very uncomfortable to work in such conditions. Sweaty palms, fogged-up safety glasses and dizziness caused by the heat can increase risk of injuries in workers. Burns can also occur due to accidental contact with hot surfaces

of autoclaves or with accidental opening of the autoclave door or due to improper closing of the door causing steam to escape.

Fire Hazards

EtO is used for gas sterilising. EtO is a highly flammable gas and improper ventilation system and leakage of the gas-line can cause accumulation of EtO in the CSSD, the use of cigarettes by staff in addition to the EtO in the air may cause a fire outbreak or even an explosion. Improper storage of flammable gases and liquids can have adverse effects and may result in fire.

Improper maintenance of electrical equipment and aging electrical cords, with the presence of water can be a source of static electricity, sparks or minor combustion which can ultimately lead to a fire due to presence of large amount of combustible materials such as gauze, linen cotton, boxes, and paper wrappers in the CSSD.

8. 1. 7 Latex Allergy

Workers normally wear latex gloves during handling and sorting of contaminated instruments and equipment is done. Some workers can develop allergy to the latex.

9. 0 LEGISLATION

The only legislative body concerned with the health and safety of workers in Mauritius is the Occupational Health and Safety Act 2005. The Superintendent, Supervisors and all the CSSD staff should be familiar with this Act as each worker will know about his rights and what work he should or should not do as per law and what protection he should have for doing a particular task.

10. 0 RECOMMENDATIONS

General Recommendations:

An effective measure to prevent workers from hazards exposure is regular job rotation to different areas of the CSSD. The employees should be provided with gowns, hair covers and shoe covers while at work. During cleaning and washing of equipments, the workers should be provided with rubber gloves and aprons. While removing carts and trays from the hot sterilisers leather gloves should be worn by the staff. Frequent hand washing with good hand washing techniques will contribute to a great extent in preventing cross-infection. It is highly recommended to the workers not to wear any jewels, e. g. rings and nail varnish while washing the instruments and while packing the items for sterilisation.

Workers must adopt safe work practices so as to prevent accidents, injuries and illnesses. Taking the necessary safety precautions while performing the required task can practically eliminate associated dangers. It is the duty of all workers to comply with specific health and safety precautions so to protect themselves from any hazard that might be present in the CSSD.

Recommendations for Chemical Hazards:

Goggles must be worn when washing and cleaning instruments as there is risk of chemicals being splashed into the eyes.

Appropriate PPE such as gloves, goggles, splash aprons should be worn by workers so as to protect them while using detergents and chemicals in the decontamination area.

In case of splash of chemicals into the eyes, the workers should flush the eyes immediately for at least 15 mins. Thus, suitable facilities for eye flashing should e situated within the working area.

Recommendations for EtO

Use proper ventilation especially for the Eto Room

Local exhaust ventilation system should be installed.

Workers exposure to EtO should be minimised when sterilization is being carried out

The door of the sterilizer should be opened no more than two inches to allow the load to " off gas" before transferring them to carts. Installation of a ventilated exhaust hood installation would be very useful.

For changing of cylinders, appropriate PPE such as butyl apron, gloves, and a canister respirator is recommended.

Recommendations for Biological Hazards:

Use protective glove for cleaning and decontamination, shoes should be closed and resistant to puncture, goggles for eye, face mask or face shield and plastic apron.

Training in of handling of sharp equipment should be given to the workers.

Engineering and Work Practice Controls must be the primary means used to eliminate or minimize exposure to blood borne pathogens.

Engineering Controls are measures (e. g., sharps disposal containers, self-sheathing needles, and safer medical devices, such as sharps injury

protections) that isolate or remove the blood borne pathogens hazard from the workplace.

Use of resistant puncture sharp containers with biohazard symbol. Container to be filled to the mark and the container should not have any leakage.

Recommendations for Ergonomics Related Hazards

Workstation need to be redesigned so packaging and equipment are within reachable levels and the elbows are maintained close to the body.

The wheels for the carts should be such that they are easily rolled.

Prolonged overhead activity need to be minimised (e. g. storage shelves should be lowered to shoulder height).

Height-adjustable work surfaces should be used or tables have to be lifted to minimise head tilt.

Repetitive tasks should be prevented by rotating workers to different work area.

The edge of the working surfaces which come into contact with the elbow or forearm should be padded to prevent contact trauma.

Sit/stand stools may be provided in the working area.

Anti-fatigue mats have to be used.

Shoes with well-cushioned insteps and soles should be worn by workers in case there is no floor mats.

Foot rest bar should be provided to the staff so can they continually alter their posture by raising one foot.

Padded Work Surfaces

Padded Work Surfaces

Recommendations for Burns and Cuts

Good work practices should be established to prevent hazards:

Hot items should not be removed from sterilisers until they are cooled.

Handling of sharp ends of instruments should be avoided.

Forceps should be used to remove sharp instruments from baskets and autoclaves

Leather gloves should be provided to workers for handling of hot items.

Recommendations to prevent from burning with Autoclave:

Unloading Autoclave

Heat-insulating gloves, safety glasses/face shield and closed toed shoes should be worn while unloading autoclaves.

Workers must make sure that the pressure of the chamber is ‘ 0’ before they open the door.

Workers should stand back away from the door as a precaution and carefully open the door not more than 1 inch (2. 5 cm) so as to allow residual steam to

escape and to the allow pressure within the liquids and containers are back to normal.

Sterilised items should be allowed to stand for 10 minutes. This will allow the steam to clear and also allow trapped air to escape from hot liquids, reducing risk . (Note: This is built into the operating cycle on some of the autoclaves).

Containers of super-heated liquids should not be agitated and caps must not be removed before unloading.

When hot items are removed from the autoclave, they should be marked with warning sign (e. g. “ Caution: Hot. Do not touch.”) till the items cools down to room temperature..

Recommendations for Slips, Trips and Falls:

Floors should be kept clean and dry.

For wet floor areas warning signs should be placed.

Proper drainage should be done during wet processes and floors mats, dry standing places should be available and waterproof footgear can also be worn by the workers.

All working area should be kept clean and in an orderly manner.

All aisles and passageways should be and free from any obstruction.

Floor plugs for equipment to prevent power cords from running across pathways.

All exits should be free from any obstruction. Access to exits doors should be easily reachable.

Slip resistant shoes should be worn.

Spills need to be reported and cleaned immediately.

Uneven floor surfaces should be eliminated.

Recommendations for Electrical hazard:

Avoid using extension cords.

All cords should have a grounded, three-prong, hospital-grade plug.

A cracked cord should be replaced immediately.

No accumulation of water should be allowed near an electrical outlet.

According to OSHA 2005 Clause 73," all electrical apparatuses and conductors including machines, equipment and fittings shall be sufficient in size and power for the work for which they are used and shall be constructed, installed, protected, worked and maintained so as to prevent danger".

Recommendations for hazards related to Heat:

Since, the place of work is quite hot; workers should wear light-coloured and