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A STUDY ON LABELLING PROCESS OF STERILE PACKS IN CENTRAL STERILE SUPPLY DEPARTMENT OF MULTISPECIALITY HOSPITAL

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ABSTRACT

The aim of the study was to understand the management and labeling process of packs and to identify labelling variations and develop a standard format of labeling in CSSD of a multispecialty hospital. Simple random Sampling method was employed to collect data from CSSD and random checks of sterile packs at different ward and ICU's of hospital. This study reveals that they are using a label with information about department name, machine in which it will be sterilized, load number and date of sterilization and date of expiry, this information is printed on label using a labeling gun and then they are writing on the packs manually about prescription sheet number, ward name and set name. There are many variations observed in the labeling that CSSD currently following. These quality indicators are important for prevention of nosocomial infection in Hospital, and also to serve a efficient patient care. 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).

Key words: Nosocomical infection, sterile packs, Labeling, CSSD.

INTRODUCTION:

The Central Sterile Supply Department (CSSD) is probably the most underestimated yet essential part of a hospital. The central sterile supply department of a multi-specialty hospital provides services in various areas of hospital. The department is responsible for cleaning, decontamination and sterilization of all reusable instruments and supplies. Defects in sterilization can lead to vicious consequences and economic burden.

The CSSD plays a vital role in patient safety and in reducing hospital surgical infection. Therefore, appropriate sterilization of surgical instruments is recommended as one of the fundamental and proven measures against surgical site infection (SSI).

CSSD is considered today, integral to the function of Out Patient Department (OPDs), wards and other departments. To maintain good workflow, sterilization process implies proper functioning and co-ordination between four zones: Dirty area, which is also called as washing area, Assembly area or packing area, sterile area and finally the sterile goods storing area

Sterilization is the act or process, physical or chemical that destroys or eliminates all forms of life, especially microorganisms. Physical parameters and chemical and biological indicators are monitored in hospital. The physical monitoring system depends upon sterilization time, temperature, and pressure. The chemical monitoring system is composed of a set of various indicators based on specific requirements such as equipment monitoring (Bowie-Dick test pack,

Class II CI), pack monitoring (internal chemical indicators, Class III-VI), and exposure monitoring (exposure control tape, Class I CI), and others. Every chemical indicator (CI) has 1 stated end-point value at which a color change occurs. A good-quality chemical indicator can easily detect steam quality, non-condensable gases, and proper sterilant penetration inside the sterilizer.

. Transmission of infectious agents through unclean and unsterile medical devices is a possibility. Breakdown in the sterility of medical devices may lead to the transmission of bacterial and viral pathogens, including those associated with multidrug resistance. Since reprocessing of expensive medical devices has to be done, it is very important that the process of cleaning, disinfection, and sterilization is subjected to stringent quality control. The central sterile supply department (CSSD) plays a critical role in ensuring that costly medical equipment is sterilized and delivered to various users in the hospital in a quality assured environment.

Aim:

To study the labeling process of sterile packs in central sterile supply department (CSSD) of a multi specialty hospital.

Objectives:

- To understand CSSD work flow and labelling process.
- To look into the labelling variations.
- To analyze the data for developing standard labelling format for CSSD.

Hypothesis:

- There is no significant difference is seen in labeling of different sterile packs of CSSD.

Scope of study:

The study was done to understand the work flow of cssd unit as it is one of the major support department and it prevents hospital infections if the equipments are properly sterilized. To identify the variations in labeling of the sterilized packs at CSSD, which are later distributed to various areas like wards, ICU's, procedure rooms etc., in hospital. Labeling places a major role as it contains info about name of hospital, department, machine name, load no, date of sterilization, date of expiry.

REVIEW OF LITERATURE

Hospitals in most countries are the main medical centers and the large portion of health costs is spent on them. Hospitals provide most of diagnostic and treatment services to the patients. However, sometimes the hospitals' environment inevitably leads to the infection of patients to the nosocomial infections, which may even lead to the death of patients. One of the essential measures to control hospital infections is planning and policy making for disinfection and sterilization of hospital equipment, because the transmission of infection to patients through contamination of hospital equipment is always possible. According to World Health Organization, the most basic work to prevent hospital infections is usually sterilizing surgical instruments, bandages and sterilization of other equipment. Therefore, proper investment and creation of processes and necessary infrastructures for proper disinfection and sterilization and optimal management of the CSSD not only is very important in terms of medicine, but also improve the quality of services and leads to the reduction and control of costs.

Central Sterile Supply Department (CSSD) is one of the important supportive services in the hospital which ensures infection free atmosphere. 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 noninvasive), 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.

Central Sterile Supply Department (CSSD) aims at centralizing the activities of receipt, cleaning, assembly, sterilization, storage and distribution of reliably sterilized material from a central department, where bacteriological safe sterilization practice is conducted under controlled conditions, adequate managerial and technical supervision and minimum cost.

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.(XI) 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 steriliant 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.

HOSPITAL PROFILE

The multi specialty hospital located at secunderabad featuring clinical excellence in over 35 specialties is the number of one hospital among the top 10 multispecialty hospital in Hyderabad. It is a1000 bedded hospital with NABH, NABL Accreditation. Considered as one of the best hospitals in South India, it offers treatments on par with many top hospitals in the western world. The hospital is making it big in the field of complex liver surgeries and lived transplants. Best doctor's in Hyderabad, India provide quality care including heart procedures, orthopedics, spine procedures, neurosurgeries, gastroenterology procedures, cancer treatments, organ transplant, robotically-performed surgeries, bariatric procedures, colorectal procedures and preventive medicine. Easily accessed from every part of the city, is among the best hospitals in Hyderabad, India. Its working towards its goal with a mission statement "To provide world – class healthcare services at affordable cost in all medical departments with a constant and relentless emphasis on quality, excellence in service, empathy and respect for the individual".

Facilities Of Hospital

Center Of Excellence:

- Heart transplant
- CT surgery
- Neuroscience
- Cancer
- Liver Transplant
- Multi- Organ Transplant
- Bones & Joints
- Nephrology
- Robotic Sciences
- Spine Surgery
- Mother& child
- Gastroenterology

Key Features

- CATH lab with DSA
- 24/7 emergency service
- Specialized intensive ICUs
- 24/7 blood bank & pharmacy
- Most advance laboratory services
- Dialysis

- Preventive health check-up package
- Ambulance with ventilator**Other Specialist**
- Cardiology
- Gynaecology
- Neuro Surgery
- Spine Surgery
- General Surgery
- Robotic Sciences
- Pulmonology
- Fertility
- Ophthalmology
- Paediatrics
- Infection diseases
- Herpetology
- CT surgery
- Surgical Oncology
- Neurology
- Gastroenterology
- Nephrology
- Vascular surgery
- ENT
- Rheumatologist

- Dermatology
- Psychiatry
- Interventional radiology
- Liver transplant surgery
- Radiation Oncology
- Orthopaedics
- Surgical Gastroenterology
- Urology
- General Medicine
- Gynaecology
- Endocrinology
- Plastic surgery
- Psychology
- Painmedicine

State Of The Art Diagnostics

- 16 Channel Hex 1.5T MRI System
- C T Guided Interventional Procedures
- High Definition PET
- Colour Doppler
- Digital Mammography
- Digital X-ray
- Fluoroscopy

- TMT, 2D Echo, TEE, HOLTER & 3D Echo
- Ultrasound with Electrograph
- Tran cranial Doppler (TCD)
- CSF Flow Study
- Nerve Condition Study
- Digital EEG/EMG
- Digital ECG
- PFT
- Endoscopy/Colonoscopy/ERCP/MRCP
- Endosonography
- Dual Source CT with Heart PBV

DEPARTMENT PROFILE

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. CSSD is situated in 2 areas, 9th floor for all wards and ICU items to be sterilized and in operation theatre. Sterile Processing Department has unidirectional work flow are typically divided into four major areas to accomplish the functions of decontamination, assembly and sterile processing, sterile storage, and distribution.

Figure 1: Four major areas of CSSD at a Multi speciality hospital

Soiled receiving area

Unsterile lift connected to OT

Packing and labeling area

Sterile processing area

Consumables storing area

Low temperature sterilizers

Sterile sets room connected to sterile lift and sterile issue area

In the decontamination area, reusable equipment, instruments, and supplies are cleaned and decontaminated by means of manual or mechanical cleaning processes and chemical disinfection. Clean items are received in the assembly and packaging area from the decontamination area and are then assembled and prepared for issue, storage, or further processing (like sterilization).

After assembly or sterilization, items are transferred to the sterile storage area until its time for them to be issued.

Several major functions are carried out in the distribution area: case cart preparation and delivery; exchange cart inventory, replenishment and delivery; telephone-order and requisition-order filling; and, sometimes, patient care equipment delivery.

Decontamination Process

Decontamination is the physical or chemical process that renders an inanimate object that may be contaminated with harmful microbial life safe for further handling. The objective of decontamination is to protect the preparation and package workers who come in contact with medical devices after the decontamination process from contracting diseases caused by microorganisms on those devices.

Steps in the Decontamination Process

Transport – Used supplies and equipment should be collected and taken to the Decontamination Area in the Sterile Processing Department in a way that avoids contamination of personnel or any area of the hospital. Equipment should be covered and supplies should be moved in covered carts, closed totes or containers, or closed plastic bags.

Attire – Personnel working in the decontamination area should wear protective clothing, which includes a scrub uniform covered by a moisture-resistant barrier, shoe covers, rubber or plastic gloves, and a hair covering. During manual cleaning processes, when splashing can occur, safety goggles and a face mask should be worn.

Sorting – sorting begins at the point of use. Handling of contaminated items should be minimized unless the user of the device is already wearing full personal protective attire, such as following

care in the operating room. In areas where workers are wearing no or minimal protective attire, sorting should consist only of removing disposable sharps and discarding other single-use items.

Soaking – this is necessary only if you have lumens or other complex designs that are filled with debris or if the devices are very bloody and cannot be rinsed or wiped at the point of use.

Washing

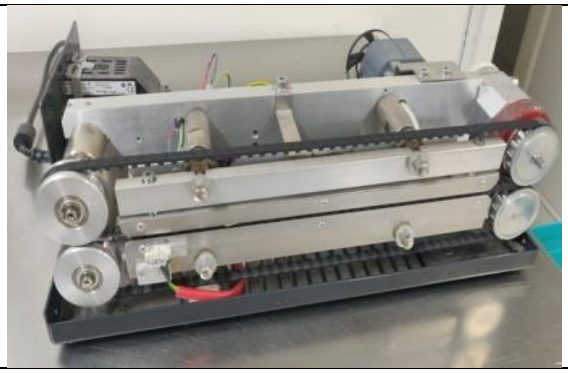
- Detergent – should be compatible with the materials in the device and suited for the type of soil. Consult the recommendations from the device manufacturer.
- Equipment – many types of cleaning equipment are available, the most commonly used are:
  - Washer/decontaminator – the washer/decontaminator is used to clean heat-tolerant items. The cycle consists of several washes and rinses, followed by a steam sterilization cycle appropriate for the types of items contained in the load. Although subjected to a cycle designed to sterilize clean items, items processed in a washer/decontaminator should not be assumed to be sterile at the end of the process. The reason for this is that items enter the washer/decontaminator with an unknown, but probably very high, level of microbial contamination, which the sterilization cycle may not be able to completely destroy.
  - Ultrasonic – the ultrasonic washer is used to remove fine soil from surgical instruments after manual cleaning and before sterilization. The equipment works by converting high-frequency sound waves into mechanical vibrations that free soil from the surface of instruments. The high-frequency energy causes microscopic bubbles to form on the surface of the instruments and as the bubbles implode, minute vacuum areas are created, drawing out the tiniest particles of debris from the crevices of the instruments. This process is called cavitation.

Inspection – after cleaning, all instruments should undergo inspection before being packaged for reuse or storage. Box locks, serrations, and crevices should be critically inspected for cleanliness. Instruments with cutting edges such as scissors, chisels, curettes, etc., should be checked for sharpness. There should be no dull spots, chips, or dents. Hinged instruments such as clamps and forceps should be checked for stiffness and alignment of jaws and teeth. Tips should be properly aligned, jaws should meet perfectly, and joints should move easily. Ratchets should close easily and hold firmly. Any instruments with pins or screws should be inspected to make sure they are intact. Plated instruments should be checked to make sure there are no chips, worn spots, or sharp edges. Worn spots can rust during autoclaving. Chipped plating can harbor soil and damage tissue and rubber gloves. If any problems are noticed during the inspection process, these instruments should be either cleaned again, or sent for repair depending on the problem observed.

Figure 2: List of instruments in CSSD and Operation theater

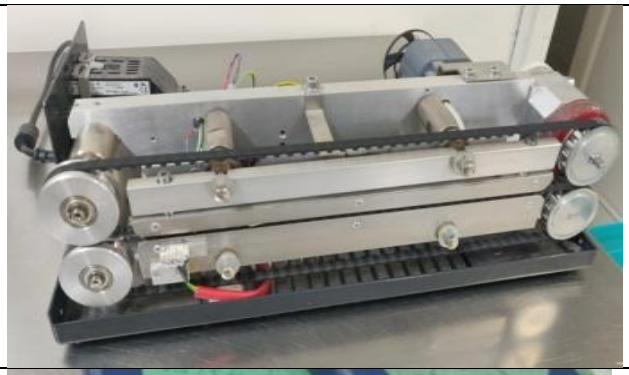
Autoclave	1 (A)	
Steam Sterilizer	2 (B,C)	 

Plasma sterilizer	1	
Eto sterilizer	2	 
Hot air oven	1	
Gauze cutter	1	
Labelling guns	3 (steam, plasma, ETO)	

Sealing machine	1	

Operation theatre:

Flash autoclave	1	
Ultrasonic washer	1	
Air gun point	2	

Sealing machine	1	
Labelling guns	1 (plasma)	

Assembly & Packaging Process

After the instruments have been cleaned and inspected, they are typically assembled into sets or trays according to recipe cards that detail instructions for assembling each set or tray.

Instruments and other items that are prepared for sterilization must be packaged so that their sterility can be maintained to the point of use. The materials and techniques used for packaging must allow the sterilant to contact the device during the sterilization process as well as to protect the device from contamination during storage and handling before it is used. The time between sterilization and use may range from a few minutes to several weeks to many months. The packaging material selected must also permit the device to be removed aseptically.

Types of Packaging

- Textiles
- Nonwovens
- Pouch packaging
- Rigid container systems

Sterilization Process

Bacterial spores are the most resistant of all living organisms because of their capacity to withstand external destructive agents. Although the physical or chemical process by which all pathogenic and non-pathogenic microorganisms, including spores, are destroyed is not absolute, supplies and equipment are considered sterile when necessary conditions have been met during a sterilization process.

Methods

Reliable sterilization depends on contact of the sterilizing agent with all surfaces of the item to be sterilized. Selection of the agent to achieve sterility depends primarily upon the nature of the item to be sterilized. Time required to kill spores in the equipment available for the process then becomes critical.

Steam

Heat destroys microorganisms, but this process is hastened by the addition of moisture. Steam in itself is inadequate for sterilization. Pressure, greater than atmospheric, is necessary to increase the temperature of steam for thermal destruction of microbial life. Death by moist heat in the form of steam under pressure is caused by the denaturation and coagulation of protein or the enzyme-protein system within the cells. These reactions are catalyzed by the presence of water. Steam is water vapour; it is saturated when it contains a maximum amount of water vapour.

Direct saturated steam contact is the basis of the steam process. Steam, for a specified time at required temperature, must penetrate every fiber and reach every surface of items to be sterilized. When steam enters the sterilizer chamber under pressure, it condenses upon contact with cold

items. This condensation liberates heat, simultaneously heating and wetting all items in the load, thereby providing the two requisites: moisture and heat.

No living thing can survive direct exposure to saturated steam at 250 F (120 C) longer than 15 minutes. And 134c longer than 4 to 7 mint As temperature is increased, time may be decreased. A minimum temperature-time relationship must be maintained throughout all portions of load to accomplish effective sterilization. Exposure time depends upon size and contents of load, and temperature within the sterilizer. At the end of the cycle, re-evaporation of water condensate must effectively dry contents of the load to maintain sterility.

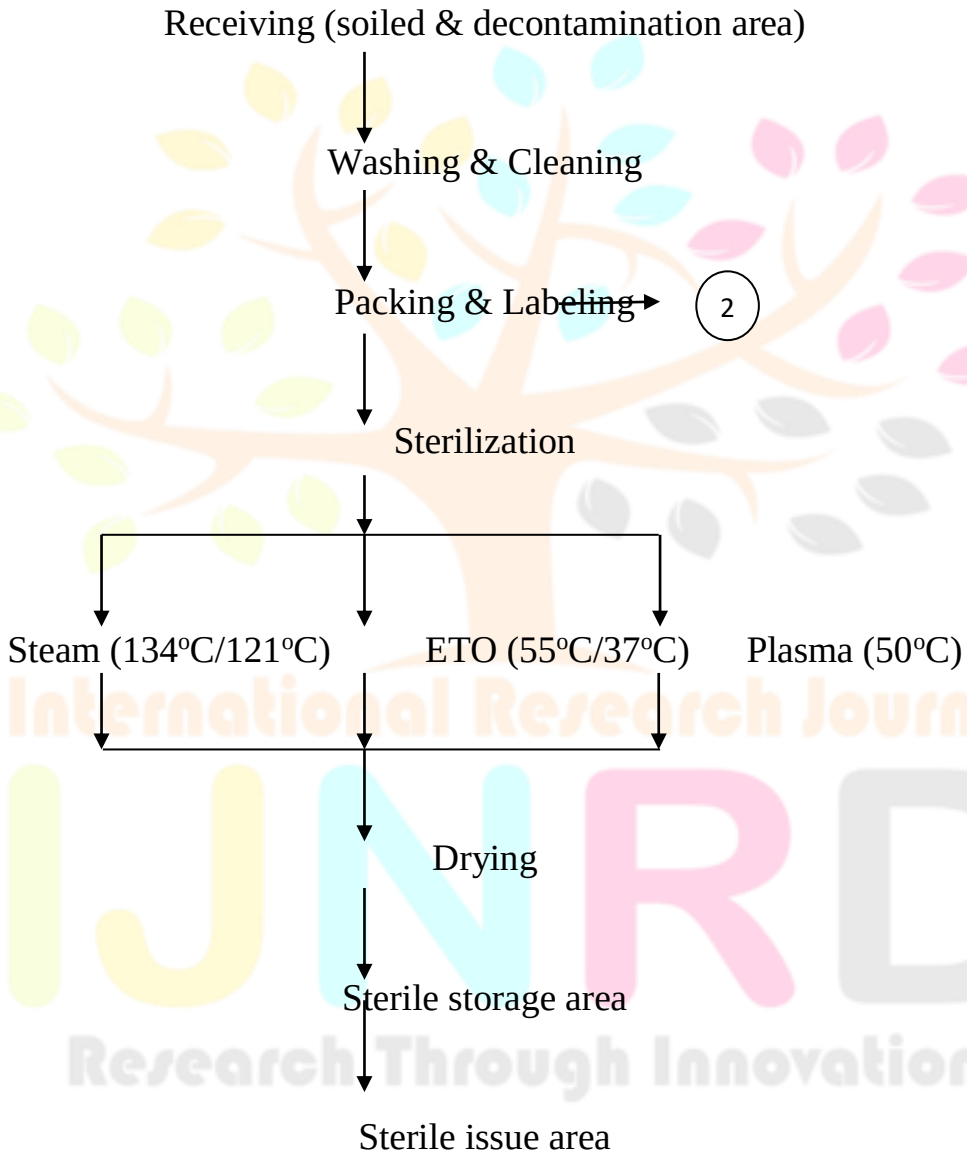
Ethylene Oxide

Ethylene oxide is used to sterilize items that are heat or moisture sensitive. Ethylene oxide (EO) is a chemical agent that kills microorganisms, including spores, by interfering with the normal metabolism of protein and reproductive, processes, (alkylation) resulting in death of cells. Used in the gaseous state, EO gas must have direct contact with microorganisms on or in items to be sterilized. Because EO is highly flammable and explosive in air, it must be used in an explosion-proof sterilizing chamber inn a controlled environment. When handled properly, EO is a reliable and safe agent for sterilization, but toxic emissions and residues of EO present hazards to personnel and patients. Also, it takes longer than steam sterilization, typically, 16-18 hrs. for a complete cycle.EO gas sterilization is dependent upon four parameters: EO gas concentration, temperature, humidity, and exposure time. Each parameter may be varied. Consequently, EO sterilization is a complex multi-parameter process. Each parameter affects the other dependent parameters.

Hydrogen Peroxide Plasma Sterilizer:

Hydrogen peroxide is activated to create a reactive plasma or vapor. Plasma is a state of matter distinguishable from solid, liquid, or gas. It can be produced through the action of either a strong electric or magnetic field, somewhat like a neon light. The cloud of plasma created consists of ions, electrons, and neutral atomic particles that produce a visible glow. Free radicals of the hydrogen peroxide in the cloud interact with the cell membranes, enzymes, or nucleic acids to disrupt life functions of microorganisms. The plasma and vapor phases of hydrogen peroxide are highly spermicidal even at low concentrations and temperature.

Figure 3: Sterilization process Flow chart.



Labeling:

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.

Figure 4: Process of labeling packs at CSSD for sterilization.

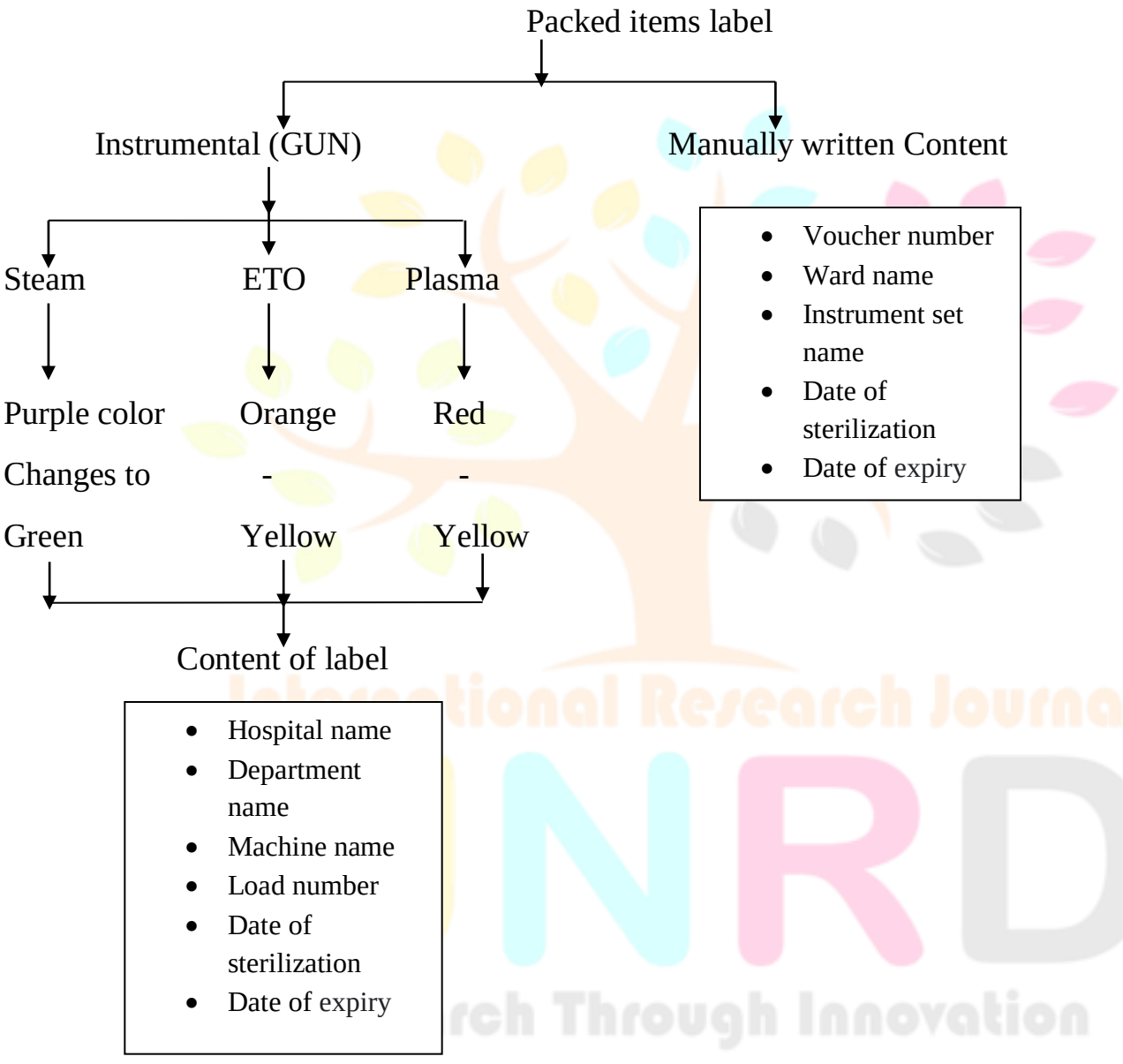
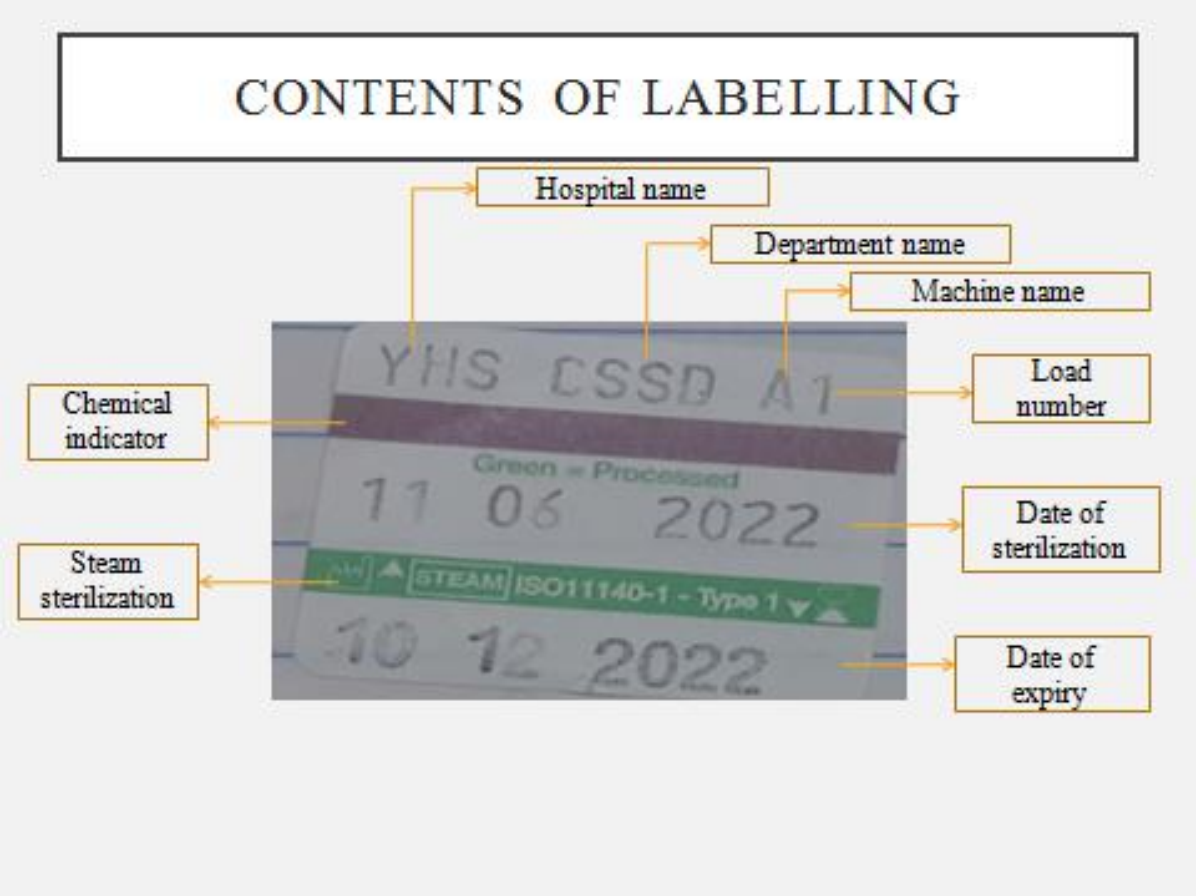


Figure 5: Contents of labeling being followed in central sterile supply department.



Quality Assurance

To ensure that instruments and supplies are sterile when used, monitoring of the sterilization process is essential.

Administrative Monitoring

Work practices must be supervised. Written policies and procedures must be strictly followed by all personnel responsible and accountable for sterilizing and disinfecting items, and for handling sterile supplies. If sterility cannot be achieved or maintained, the system has failed. Policies and procedures pertain to:

- Decontaminating, terminally sterilizing, and cleaning all reusable items; disposing of disposable items.

- Packaging and labeling of items.
- Loading and unloading the sterilizer.
- Operating the sterilizer.
- Monitoring and maintaining records of each cycle.
- Adhering to safety precautions and preventive maintenance protocol.
- Storing of sterile items.
- Handling sterile items ready for use.
- Making sterile transfer to a sterile field.

Mechanical Indicators

Sterilizers have gauges, thermometers, timers, recorders, and/or other devices that monitor their functions. Most sterilizers have automatic controls and locking devices. Some have alarm systems that are activated if the sterilizer fails to operate correctly. Records are maintained and review for each cycle. Test packs (Bowie-Dick test) are run at least daily to monitor functions of each sterilizer, as appropriate. These can identify process errors in packing or loading.

Chemical Indicators

A chemical indicator on a package verifies exposure to a sterilization process. An indicator should be clearly visible on the outside of every on-site sterilized package. This helps differentiate sterilized from unsterilized items. More importantly, it helps monitor physical conditions within the sterilizer to alert personnel if the process has been inadequate. An indicator may be placed inside a package in a position most likely to be difficult for the sterility to penetrate. A chemical indicator can detect sterilizer malfunction or human error in packaging or

loading the sterilizer. If a chemical reaction on the indicator does not show expected results, the item should not be used. Several types of chemical indicators are available:

- Tape, labels, and paper strips printed with an ink that changes color when exposed to one or more process parameters.
- Glass tube with pellets that melts when a specific temperature is attained in sterilizer.
- Integrating or wicking paper with an ink or chemical tablet at one end that melts and wicks along paper over time under desired process parameters. The color bar reaches the "accept" area if parameters are met.

Biological Indicators

Positive assurance that sterilization conditions have been achieved can be obtained only through a biologic control test. The biologic indicator detects non sterilizing conditions in the sterilizer. A biologic indicator is a preparation of living spores resistant to the sterilizing agent. These may be supplied in a self-contained system, in dry spore strips or discs in envelopes, or sealed vials or ampoules of spores to be sterilized and a control that is not sterilized. Some incorporate a chemical indicator also. The sterilized units and the control are incubated for 24 hours for Bacillus stearothermophilis at 131 to 141°F (55 to 66°C) to test steam under pressure, for 48 hours for Bacillus subtilis at 95 to 98.6°F (35 to 37°C) to test ethylene oxide.

A biologic indicator must conform with USP testing standards. A control test must be performed at least weekly in each sterilizer. Many hospitals monitor on a daily basis; others test each cycle. Very load of implantable devices must be monitored and the implant should not be used until negative test results are known. Biological indicators also are used as a challenge test before

introducing new products or packaging materials, after major repairs on the sterilizer, or after a sterilization failure. All test results are filled as a permanent record for each sterilizer

RESEARCH METHODOLOGY

Research design is used to study the labeling process and identify variation in the labeling of sterile packs in central sterile supply department (CSSD) of a multi specialty hospital.

Study Type: The Descriptive research design will be used for the study. It includes collection of information and opinion directly from the subject of the study through observation, structured Interview and survey of sterile packs labeling at wards, ICU's.

Source of Data:

The primary data will be collected from the staff of the CSSD department and management of selected hospital through structured interview and questionnaire method. The secondary data was collected from hospital profiles, websites, and articles.

Method Of Collection Of Data:

A structured interview, observation was used to collect information from department staff and ward and ICU in charges in regards with sterile packs labeling.

Sample And Sampling Technique:

Simple random sampling method was employed for sample selection. The samples are collected from ward and ICU's areas. Total sample size of 130 from department, wards and ICU's and sample size of 50 from Operation theater was collected.

Plan For Data Analysis:

Collected data will be analyzed by using MS Excel and the data is a presented as graphs and tables.

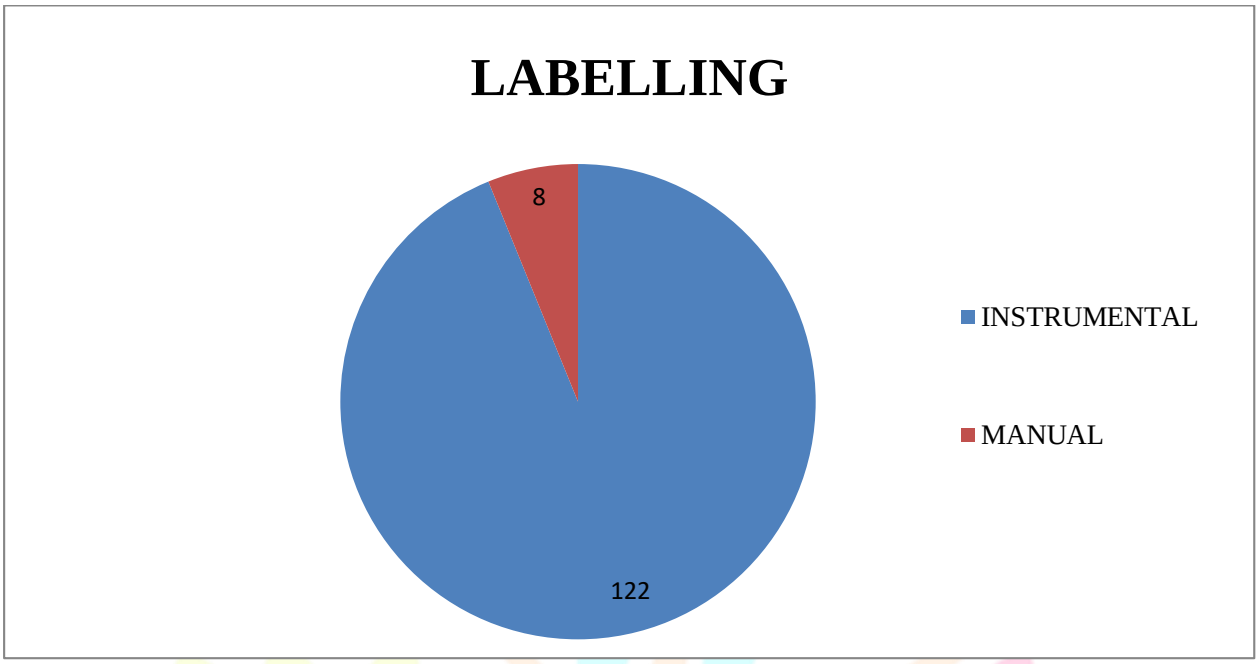
RESULTS

Part 1 – Labeling checks in CSSD, wards and ICU'S

Table 1 : Responses regarding the type of labeling method employed.

Type Of Labelling Method	Frequency	Percentage
Instrumental	122	94%
Manual	8	6%
Total	130	100%

Figure 6: Responses regarding the type of labeling method employed.



Inference: The above table 1 and figure 6 depicts that about 94% of samples are labeled using instruments(guns) stickers and about 6% of them are labeled manually. The manual errors found can be avoided they are manually written because of printing errors. Mostly rewriting on printed sticker are more common errors.

Table 2: Responses regarding the type of sterilization method employed.

Type Of Sterilization	Number of Sterile Packs	
	Frequency	Percentage
Steam	97	75%
ETO	33	25%
Total	130	100%

Inference: The table 2 and figure 7 indicates different type of sterilization method employed for various samples which are collected, about 75% samples are sterilized by steam sterilization and about 33% samples are sterilized by ETO sterilization

Figure 7: Responses regarding the type of sterilization method employed.

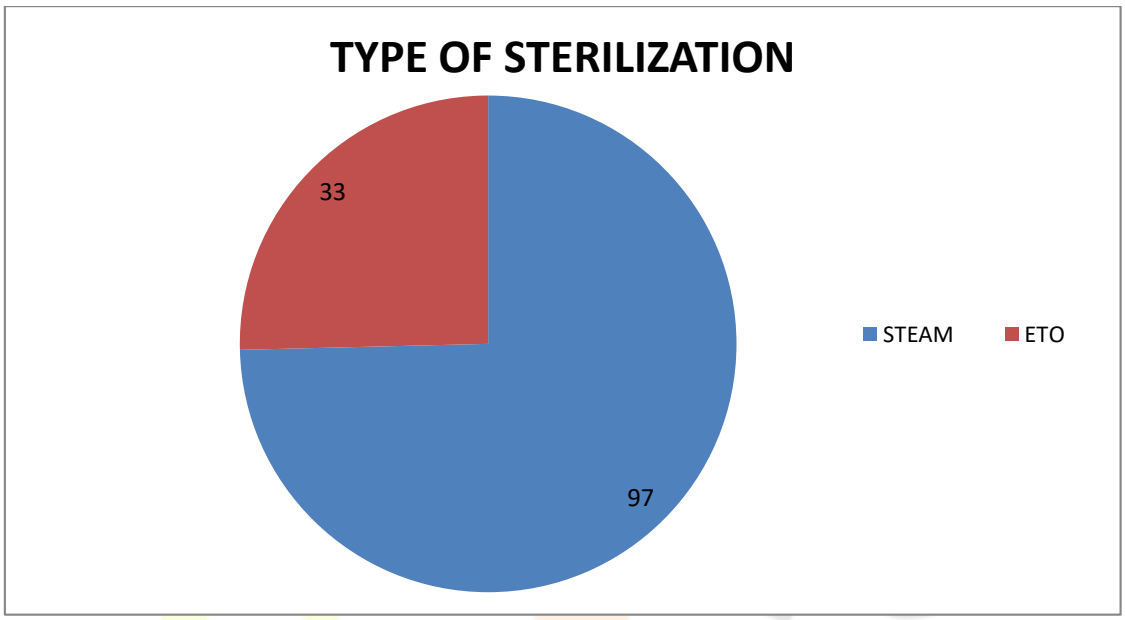


Table 3: Responses regarding different variations observed in sterilized packs

	Variations Of Samples	
Type Of Sterilization	**No Of Packs**	**Variation (Yes)**
Steam	97	57
Eto	33	21
Total	130	78

Inference: The table 3 and figure 8 indicate the variations seen in sample size of 130 for steam and ETO sterilization. Out of 97 steam sterile packs 57 variations in labeling content are seen and out of 33 ETO samples 21 variations are seen.

Figure 8: Responses regarding different variations observed in sterilized packs

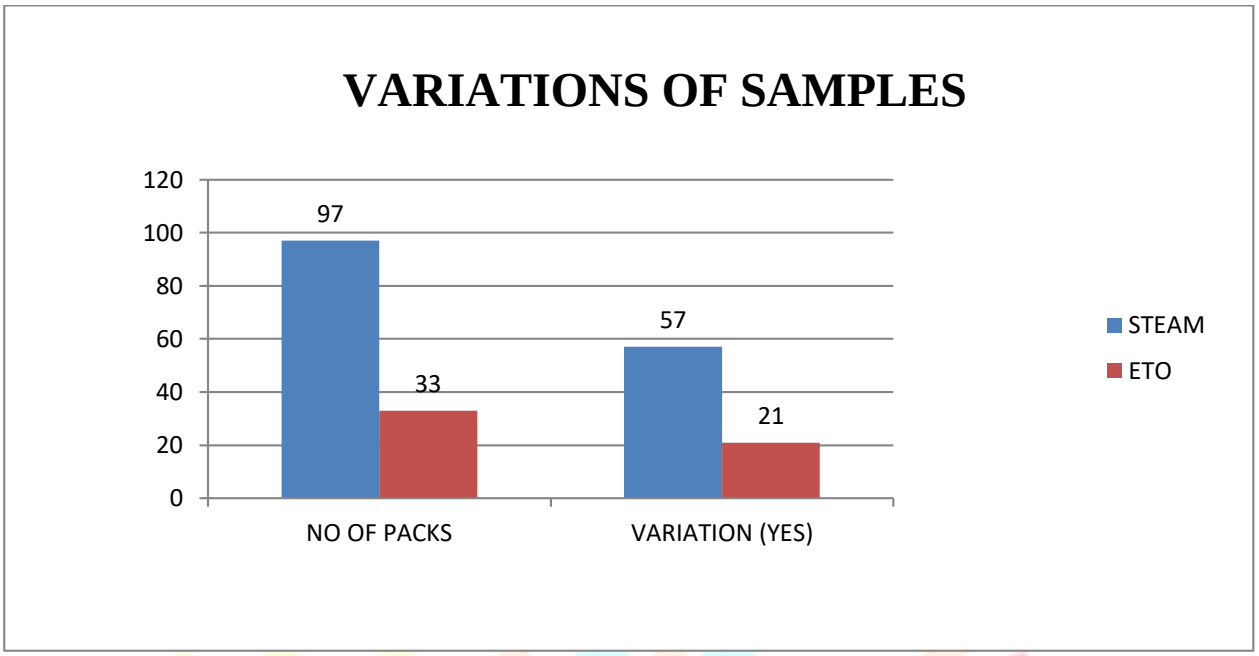


Table 4: Responses regarding different sizes of sterile packs .

Size Of Packs	Number Of Packs	
	Frequency	Percentage
Large	18	14%
Medium	74	57%
Small	38	29%
Total	130	100%

Inference: Table 4 and figure 9 are depicts the different size of samples collected about 14% are large packs and 57% are medium sized packs and about 29% are small packs .

Figure 9: Responses regarding different sizes of sterile packs .

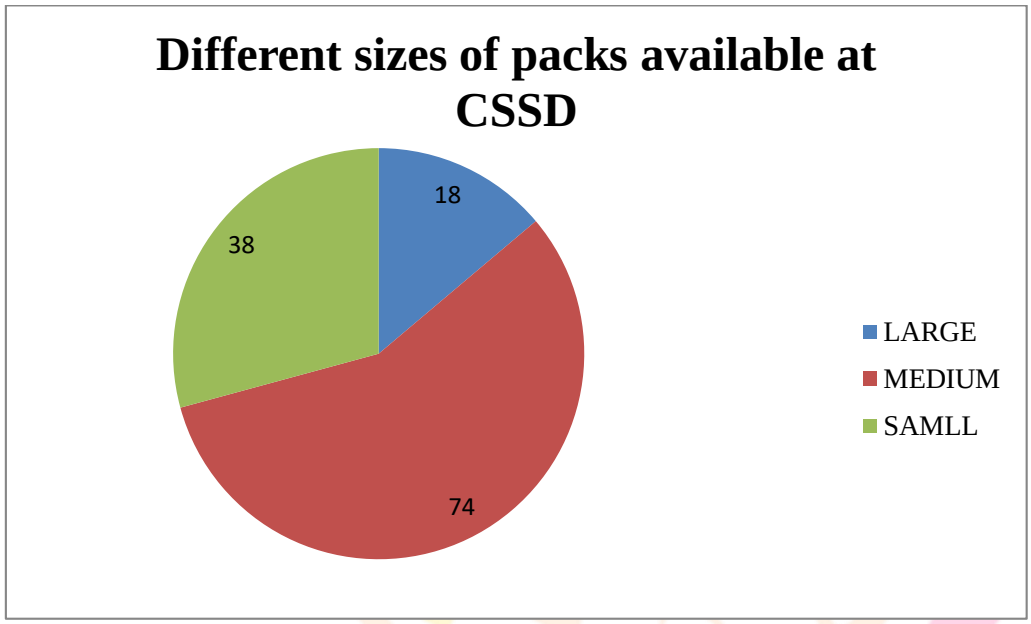
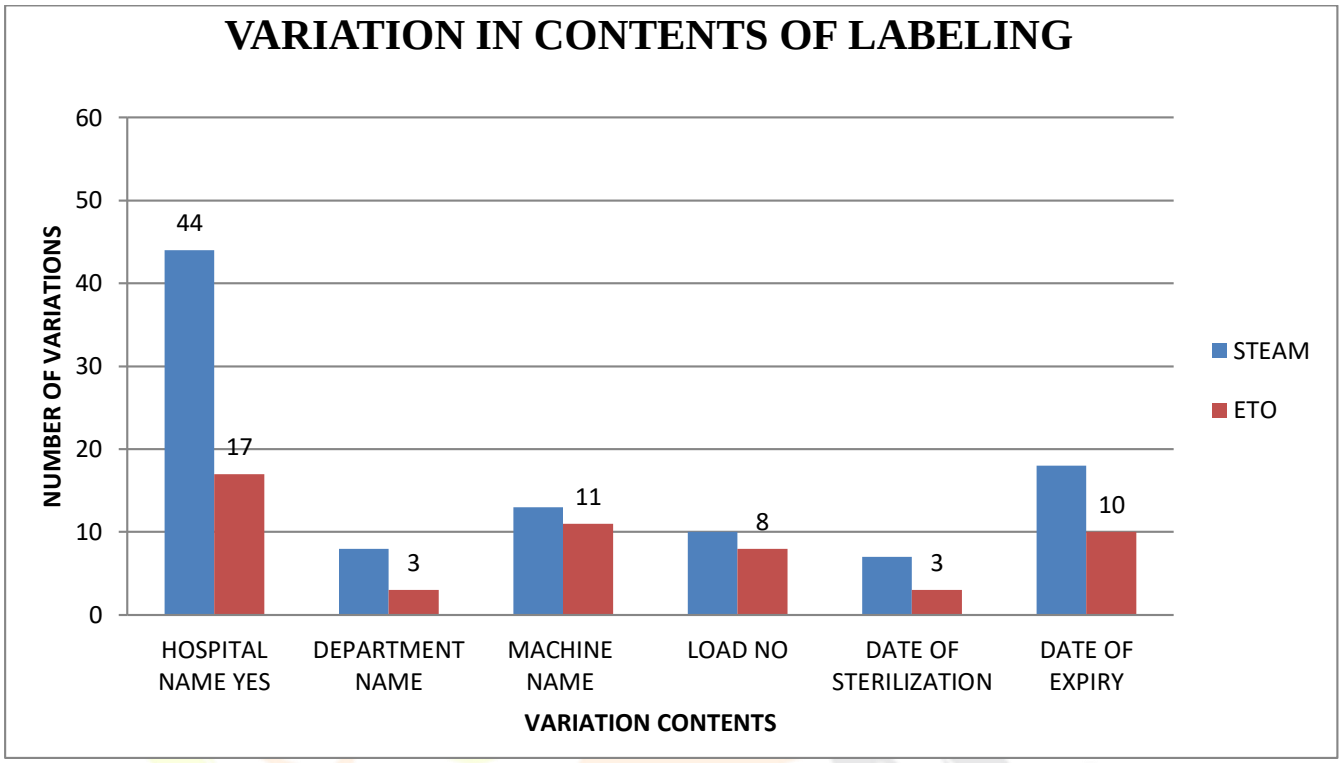


Table 5: Responses regarding different variation in labeling content

Variation In Labelling Content	Steam	ETO
Hospital Name	44	17
Department Name	8	3
Machine Name	13	11
Load Number	10	8
Date Of Sterilization	7	3
Date Of Expiry	18	10

Figure 10: Responses regarding different variation in labeling content

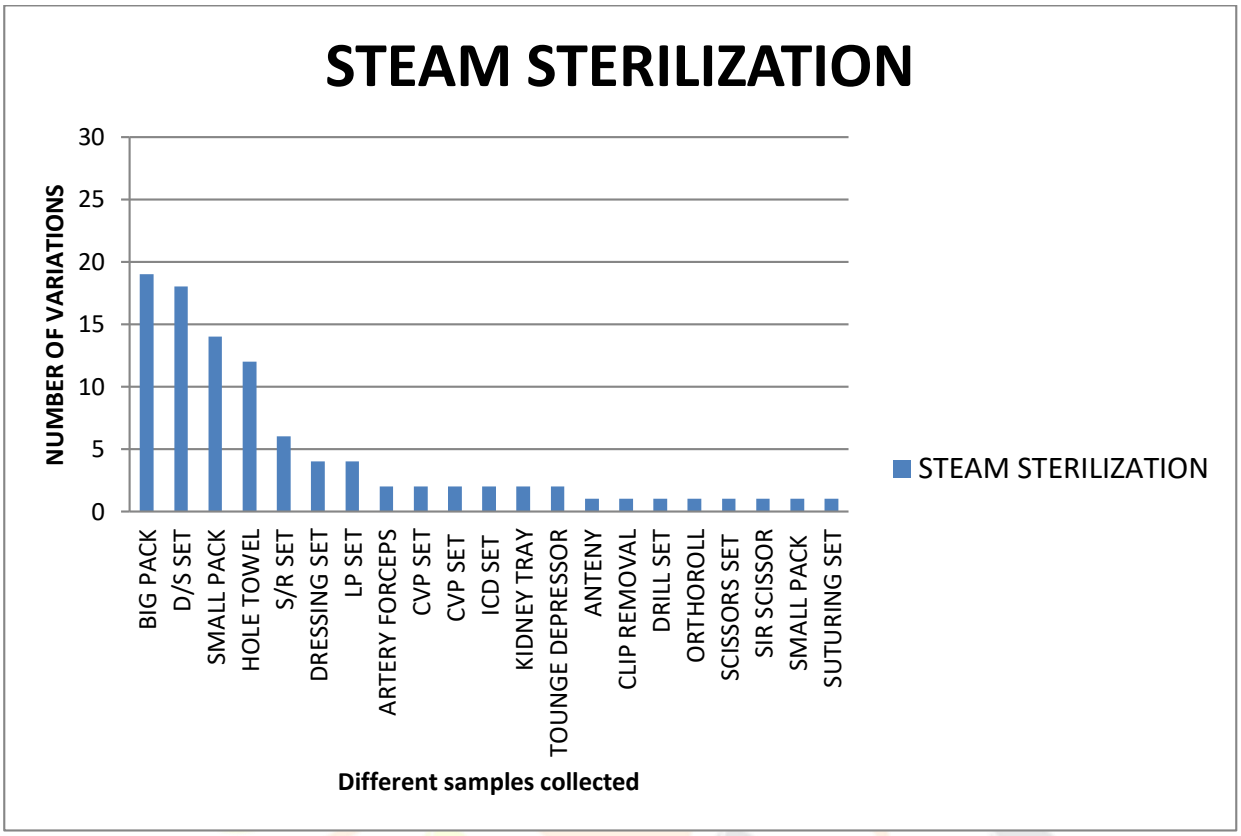


Inference: Table 5 and figure 10 shows the variations in labeling content. In steam sterilization there are about 44 variation in hospital name, 8 in department name, 13 in machine name, 10 in load number, 7 in date of sterilization, and 18 in date of expiry. Where as in ETO sterilization hospital name there are17 variations, 3 in department name, 11 in machine name, 8 in load number, 3 in date of sterilization, and 10 in date of expiry.

Table 6: Responses regarding different types of packs sterilized using steam sterilization

Name Of The Pack	Steam Sterilization
Big Pack	19
D/S Set	18
Small Pack	14
Hole Towel	12
S/R Set	6
Dressing Set	4
LP Set	4
Artery Forceps	2
CVP Set	2
CVP Set	2
ICD Set	2
Kidney Tray	2
Tongue Depressor	2
Anteny	1
Clip Removal	1
Drill Set	1
Ortho roll	1
Scissors Set	1
Sir Scissor	1
Small Pack	1
Suturing Set	1

Figure 11: Responses regarding different types of packs sterilized using steam sterilization



Inference:

Table 6 and figure 11 depicts different types of instruments or sets sterilized by steam sterilization. We can see that different types of instruments are collected for samples

Table7: Responses regarding different types of packs sterilized using ETO sterilization

Packs Names	ETO
Ambu Mask	1
Anatomical Mask	1
Balloon Guide wire	1
Bipa Mask	1
Bone Biopsy Needle	1
Guide Wire	1
I Gel	1
Innecandbla	1
LMA	1
Mask	1

Moyk	1
Nasal Cannula	1
Nasal Tubing	1
O2 Connector	1
Oxygen Tube	1
Quick Biopsy Needle	1
Skin Stapler	1
Mask OT	2
Nasal Sponge	2
Ambu Bag	6
Dressing Kit	6

Inference:

Table 7 and figure 12 depicts different types of instruments or sets sterilized by ETO sterilization and its frequency

Figure 12: Responses regarding different types of packs sterilized using ETO sterilization

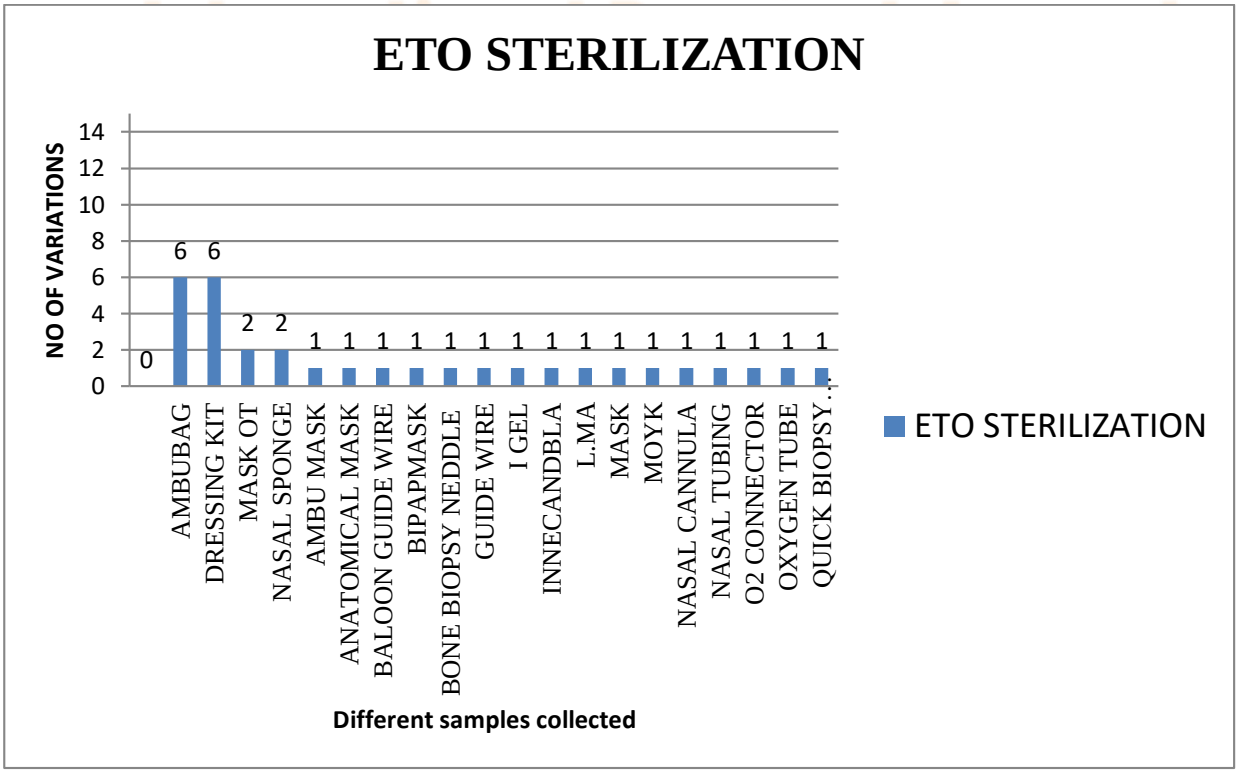
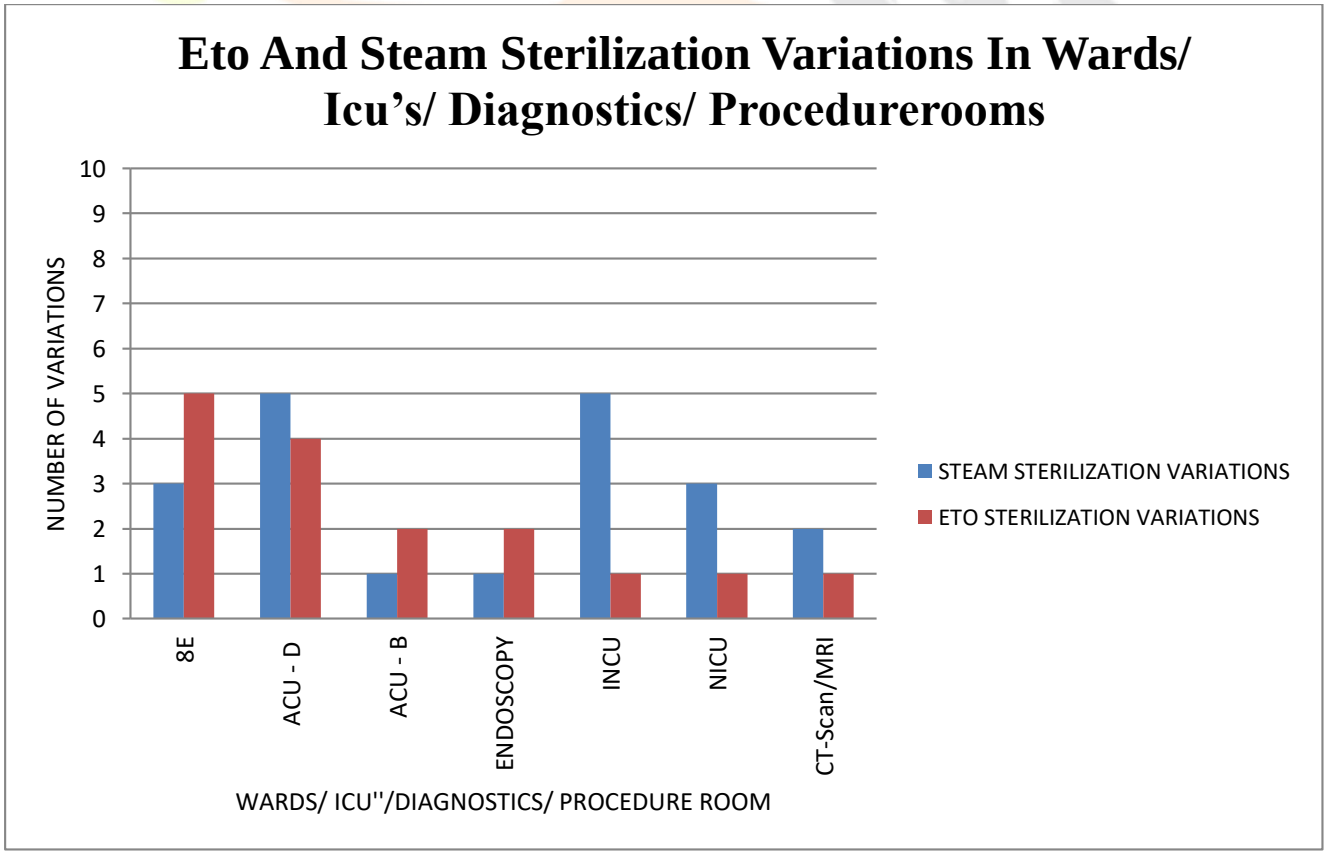


Table 8: Responses regarding variations in steam and ETO sterilization at wards/ICU's/ Diagnostics/ Procedure rooms

Wards/Icu's/ Diagnostics/ Procedure Rooms	Steam Sterilization Variations	Eto Sterilization Variations
8E	3	5
ACU - D	5	4
ACU - B	1	2
ENDOSCOPY	1	2
INCU	5	1
NICU	3	1
CT-Scan/MRI	2	1

Figure 13: Responses regarding variations in steam and ETO sterilization at wards/ICU's/ Diagnostics/ Procedure rooms



Inference:

Table 8 and figure 13 indicates the samples collected from different wards, ICU's, diagnostics and procedure rooms and variations seen in steam &ETO sterilized samples in these areas.

Table 9: Responses regarding steam sterilized samples with variations collected from different wards/ICU's/diagnostics/ procedure rooms

Wards/Icu's/ Diagnostics/ Procedure Rooms	Number of Steam Sterilized packs
Endoscopy	5
INCU	5
4th A Room Side	5
4th C Room Side	4
4th D Room Side	4
8e Room Side	3
8th A Room Side	3
BSU	3
HDU	3
Oncology Day Care	3
8G 8F	2
ACU - D	2
Cardiology Nursing Station	2
Ct-Scan/MRI	2
PICU	2
Cardiology	2
Oncology H,I,J	2
ACU - B	2
NICU	1

Ultrasound	1
8th C Room Side	1

Table 10: Responses regarding ETO sterilized samples with variations collected from different wards/ICU's/diagnostics/ procedure rooms

Wards/Icu's/ Diagnostics/ Procedure Rooms	**Number of ETO Sterilized packs**
NICU	6
CT-Scan/MRI	5
AMCU - 1,2	3
Endoscopy	3
INCU	3
PET SCAN	3
ACU - B	2
4th B room side	1
8E	1
8G,F	1
8th C room side	1
ACU - D	1
HDU	1
PICU	1
Ultrasound	1

Inference:

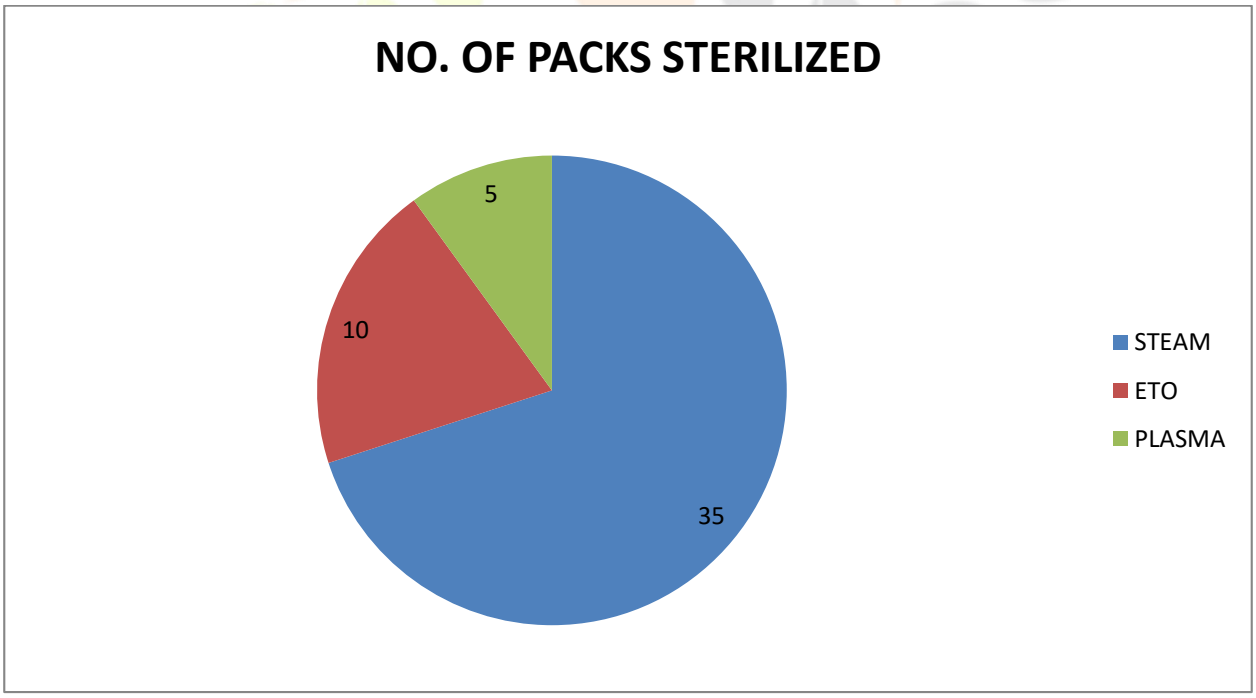
Table 9 and table 10 indicates samples collected from different areas like wards, ICU's, room sides, diagnostics and procedure rooms.

Part 2 – Labeling checks in Operation Theater complex

Table 11: Responses regarding the type of sterilization method employed

Type of sterilization	Number of samples	Percentage
ETO	10	20
Plasma	5	10
Steam	35	70
Total	50	100

Figure 14: Responses regarding the type of sterilization method employed



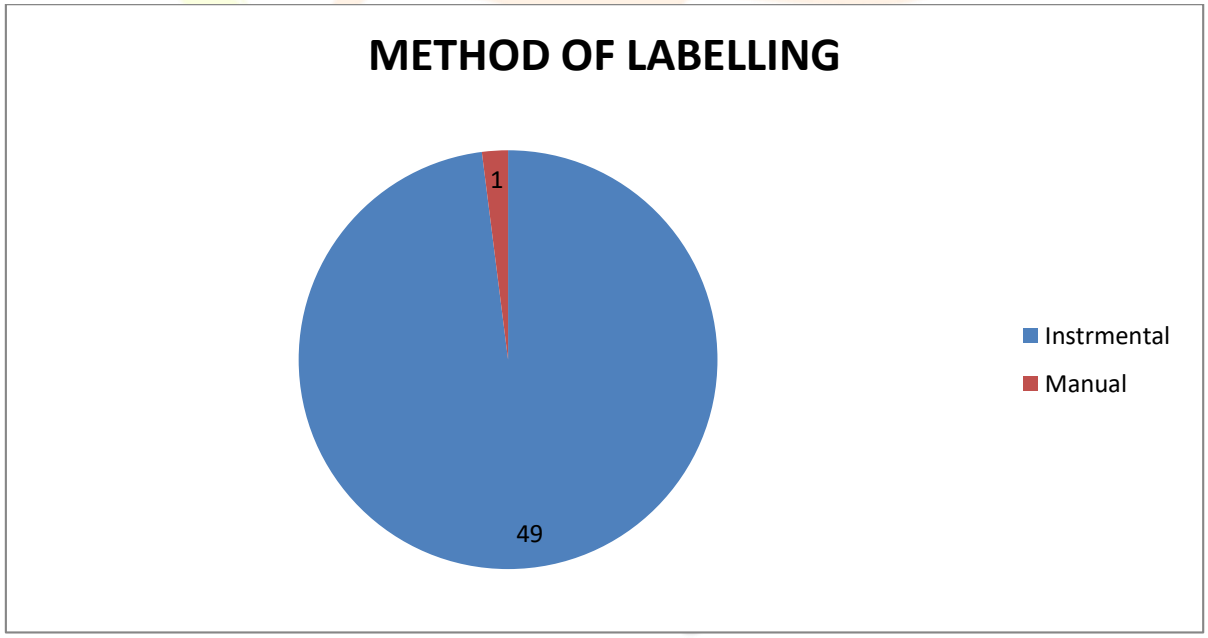
Inference:

Table 11 and figure 14 depicts the samples of different sterilization, about 70 percent are steam sterilized, 10 percent of plasma sterilization and about 20 percent of ETO sterilized.

Table 12: Responses regarding the labeling method used in Operation Theater complex.

Method of labelling	Number of samples	Percentage
Instrumental	49	98
Manual	1	2
Total	50	100

Figure 15: Responses regarding the labeling method used in Operation Theater complex.

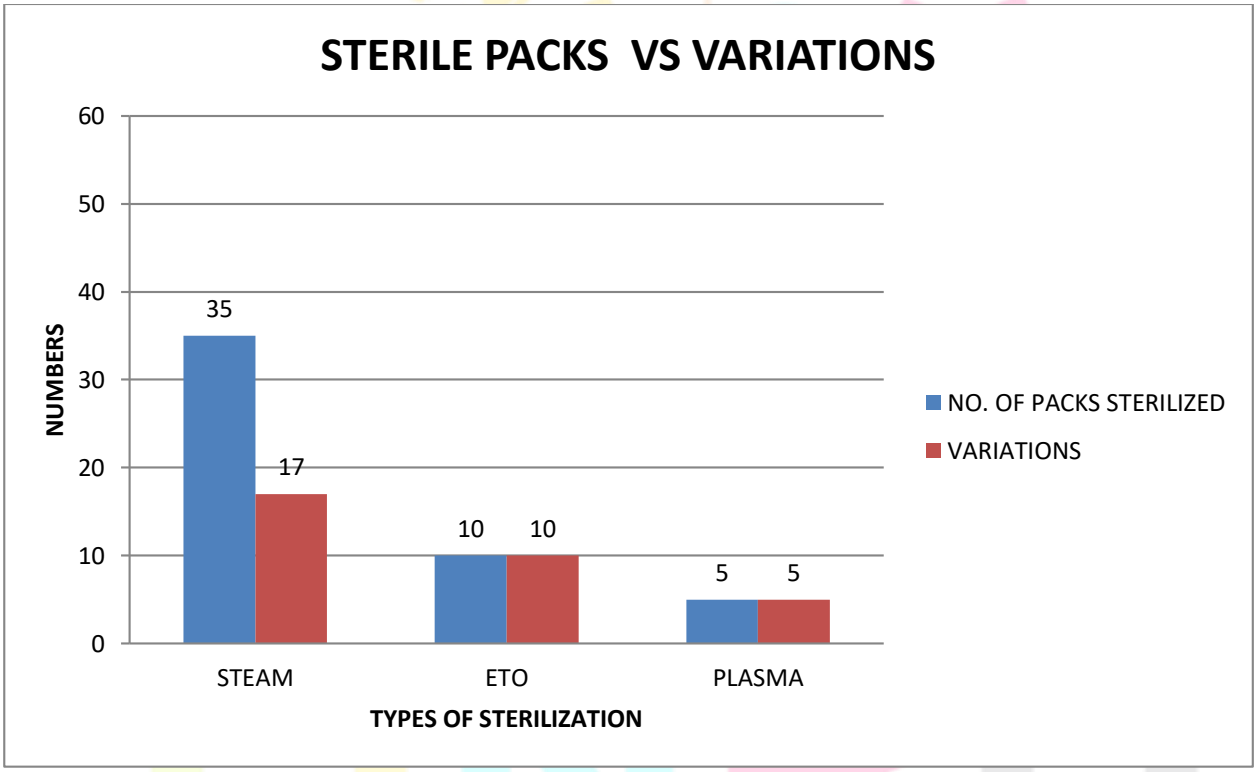


Inference: The above table 12 and figure 15 depicts that about 98% of samples are labeled using instruments(guns) stickers and about only 2% of them are labeled manually. The manual errors found can be avoided they are manually written because of printing errors.

Table 13: Responses regarding the variation in different sterilized packs.

Type of sterilization	Variations
Steam	17
ETO	10
Plasma	5

Figure 16: Responses regarding the variation in different sterilized packs.



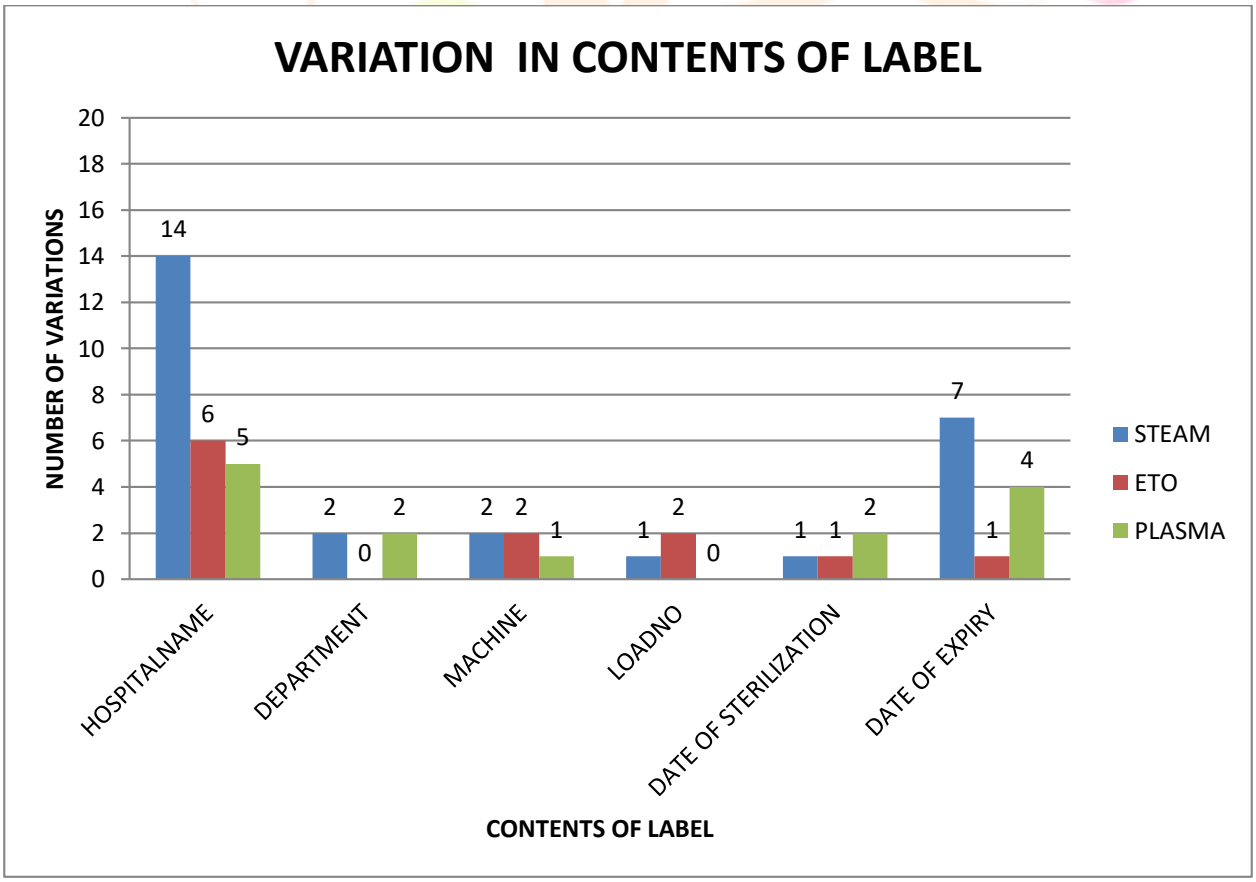
Inference:

Table 13 and figure 16 indicates the variations among the collected samples of different sterilization methods. Out of 35 steam sterilized samples 17 variations are seen. In ETO sterilized samples out of 10 samples 10 sample variations are seen. In Plasma sterilization out of 5 samples 5 are showing variations in labeling

Table 14: Responses regarding the variation in labeling content

Variation In Labelling Content	Steam	Plasma	ETO
Hospital Name	14	5	6
Department Name	2	2	0
Machine Name	2	1	2
Load Number	1	0	1
Date Of Sterilization	1	2	1
Date Of Expiry	7	4	1

Figure 17: Responses regarding the variation in labeling content



Inference:

Table 14 and figure 17 shows the variation in labeling content of the samples collected at Operating theater complex. In steam sterilization there are about 14 variation in hospital name, 2 in department name, 2 in machine name, 1 in load number, 1 in date of sterilization, and 7 in date of expiry. Where as in ETO sterilization hospital name there are 6 variations, no variations in department name, 2 in machine name, 1 in load number, 1 in date of sterilization, and 1 in date of expiry and in plasma sterilization there are about 5 variation in hospital name, 2 in department name, 1 in machine name, no variation in load number, 2 in date of sterilization, and 4 in date of expiry**.**

SUGESTIONS/ RECOMMENDATIONS

On the basis of results and analysis of the study, it is recommended that some changes be considered in order to improve labeling process of sterile packs of CSSD.

1. Standard format of labeling making sure to avoid the burden of written work on CSSD staff.
2. Having standard operating guidelines of labeling.
3. Having adequate equipment necessary for labeling.
4. Regular monitoring and random checks can prevent occurrence of errors.
5. Uniform content on label for small packs.

YHS - CSSD	**A**	**01**

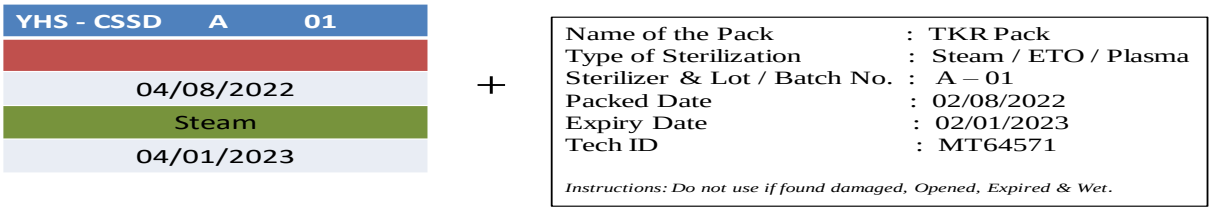
Hospital Name		
& Dept. Name	**Sterilizer No.**	**Batch / Load No.**
Colour Indicator		
DD/MM/YY (Sterilization Date) & Time		
Colour Indicator (Type of Sterilization)		
DD/MM/YY (Expiry Date)		

6. Extra printed label for Big & Medium Sized Packs

Name of the Pack	: TKR Pack
OT Name	: OT 1 (applicable
Type of Sterilization	: Steam / ETO / Plasma
Sterilizer & Lot / Batch No.	: A – 01
Packed Date	: 02/08/2022
Expiry Date	: 02/01/2023
Tech ID	: MT64571

Instructions: Do not use if damaged, Opened, Expired / found Wet.

- Example:



CONCLUSION

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). 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. Labeling of packs plays a major role in identification of whether sterilization is successful or not. labeling have chemical indicators which changes colour on exposure to steam, EO gas and Hydrogen peroxide gas which acts as an indicator of successful sterilization. Here at CSSD of a multispecialty hospital we can find two different types of contents of labeling manually which is written by staff and instrumental with guns have information printed on it. There is no standardized labeling format and guidelines to follow during labeling process. The variations found are very basic errors which can be avoided by following standard format and preprinted labeling.