



**The Republic of Uganda
MINISTRY OF HEALTH**

Medical Equipment User Training Manual for National and Regional User Trainer

February 2020

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FOREWORD

The main core function of Ministry of Health is to provide quality Health care services to the population.

The government of the republic of Uganda is committed to ensuring the efficient use of public funds, patient safety and effective delivery of Health care. A big proportion of the Health Sector expenditure is spent on the purchase of medical equipment. Medical equipment needs to be managed efficiently. The way in which it is purchased and used can influence the quality of Health care delivered to patients.

Medical equipment can also be risky to patients and staff if not used properly. First line maintenance by equipment users is the most cost effective in managing medical equipment that is not faulty. Technicians come in for servicing and repair of faulty equipment.

It is therefore important that measures are taken to ensure that equipment is properly maintained and cared for by the Health workers.

Therefore, the Ministry of Health, in cooperation with Japan International Cooperation Agency, completed the first edition of the medical equipment user training manual in December 2013.

This manual provides information regarding the different roles of all stake holders in medical equipment management. If they play their part in ensuring that Equipment functions to its best capacity, this will reduce on the cost of repair and replacement of the Equipment thereby saving government money.

However, after the first edition in December 2013, due to technical innovation, increase in new types of equipment, changes in teaching procedures, etc. made it necessary to revise the edition.

Therefore, the Ministry of Health, in cooperation with Japan International Cooperation Agency, created and completed the second edition of the medical equipment user training manual.

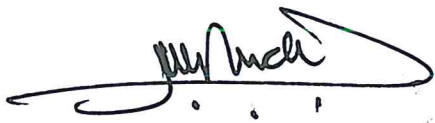
The main revision points in the second edition are as follows.

1) Addition of general management of medical equipment. (2.3)

- 2) Excerpts from national infection and control guidelines in Uganda. (2.4)
- 3) Explanation of NOMAD system and equipment category classification (2.5)
- 4) Addition of new target medical equipment. (3.28, 3.29, 3.30)
- 5) Review and correction of explanation procedure and contents of all target medical equipment.

Special thanks go to Japan International Corporation Agency and the user trainers for editing and preparation of the second edition of the Medical Equipment User Training Manual.

I am sure it will be useful to all the User trainers while training the equipment users in the health facilities.

A handwritten signature in black ink, appearing to read 'H. Mwebesa', with a long horizontal stroke extending to the left.

Dr. Henry G. Mwebesa

DIRECTOR GENERAL HEALTH SERVICES

ACKNOWLEDGEMENT

The User Training Manual was developed through a review processes and a series of meetings to develop, compile and edit the current copy of the manual.

Special thanks go to the user trainers (*Alezuyo Janet, Adriko Innocent, Katusiime Constance, Kabajuni Sarah, Tushemereirwe Justin Anne, Byarugaba Alison, Musoke Prossy, Namuddu Joanita, Mutesasira Mike, Acheng Molly Grace, Lukia Kabitanya, Aciro Julia, Akello Christine, Okwir John Van, Anyeko Evelyn, Mujalasa Christine, Keem Jackson, Nambozo Hadija, Nafuna Lydia, Acayo Agnes Lillian, Atim Esther Stella, Atugonza Rita Maureen, Najjingo Lydia, Nakalembe Molly, Agwang Joyce, Basemera Kevin, Mulwany Fredrick, Halima Adam, Mirembe Violet, Aryeija Justus, Tumugumye Rhoda, Katigi Lodger, Epeduno Gabriel, Akongo Agnes, Anguzu Henry*) for their commitment in developing this training manual.

Special thanks go to the JICA Expert, Mr. Yasuhiro Hiruma,

We also recognize the administrative support given during planning and implementation of this activity by the Commissioner Clinical Service Dr. Amone Jackson, the Principal Medical Officer (PMO), Dr. Obonyo John, the Principal Nursing Officer (PNO) Sr. Kembabazi Harriet, Hospital Directors of different Hospitals (Arua RRH, Fort Portal RRH, Gulu RRH, Hoima RRH, Jinja RRH, Kabale RRH, Lira RRH, Masaka RRH, Mbale RRH, Mbarara RRH, Moroto RRH, Mubende RRH, Naguru RH, Soroti RRH, and Entebbe RRH).

We extend our sincere gratitude to the Ministry of Health Management structures for the support in ensuring that the manual is a success.

Further appreciation is extended to JICA office Uganda for the financial support in the manual developing.


Dr. Jackson Amone

COMMISSIONER CLINICAL SERVICES

ACRONYMS

List of Acronyms and Abbreviations

CWS	Central Medical Equipment Maintenance Workshop
CQI	Continuous Quality Improvement
DHOs	District Health Officers
GH	General Hospital
HC	Health Center
HID	Department of Health Infrastructure
IP	Implementing partners
JICA	Japan International Cooperation Agency
MCH	Maternal and Child Health
MOH	Ministry of Health
NACME	National Advisory Committee on Medical Equipment
NO	Nursing Officer
OPD	Outpatient Department
PS	Permanent Secretary
PPM	Planned Preventive Maintenance
PHA	Principal Hospital Administrator
PMO	Principal Medical Officer
PNO	Principal Nursing Officer
RRH	Regional Referral Hospital
RWS	Regional Medical Equipment Maintenance Workshops
SPNO	Senior Principal Nursing Officer
TOT	Training of Trainers

Table of Contents

FOREWORD	ii
DIRECTOR GENERAL HEALTH SERVICES.....	iii
ACKNOWLEDGEMENT	iv
ACRONYMS.....	v
1. Overview.....	1
1.1 Introduction	1
1.2 Background.....	1
1.3 Objectives	2
1.4 Stakeholders	2
1.5 Organization Structure	4
2. General Information	5
2.1 Introduction	5
2.2 List of Target Medical Equipment covered in the Manual.....	5
2.3 General Management of Medical Equipment	7
2.4 Uganda National Infection Prevention and Control Guideline	10
2.5 Classification of condition for Medical Equipment	15
3. MEDCAL EQUIPMENT USER TRAINING MANUAL	16
3.1 AUTOCLAVE	16
3.2 BOILER.....	19
3.3 TABLETOP ELECTRICAL AUTOCLAVE.....	21
3.4 OXYGEN CYLINDER SET.....	25
3.5 OXYGEN CONCENTRATORS	28
3.6 VACUUM EXTRACTOR	31
3.7 OPERATING TABLE.....	34
3.8 DELIVERY BED	36
3.9 NEBULIZER.....	38
3.10 SUCTION MACHINE	41
3.11 SPHYGMOMANOMETER (BLOOD PRESSURE MACHINES)	44
3.12 WEIGHING SCALE.....	47

3.13 RESUSCITATOR.....	50
3.14 RECOVERY BED.....	53
3.15 PULSE OXIMETER.....	55
3.16 MANUAL VACUUM ASPIRATOR (MVA).....	57
3.17 INFANT WARMER.....	61
3.18 INFANT INCUBATOR.....	64
3.19 HOT AIR OVEN	67
3.20 ELECTROCARDIOGRAM (ECG).....	70
3.21 FETAL DOPPLER.....	74
3.22 AUTOCLAVES.....	76
3.23 DIATHERMY	79
3.24 BLOOD GLUCOMETER	81
3.25 PATIENT MONITOR.....	84
3.26 DEFIBRILLATOR.....	87
3.27 ULTRASOUND SCANNING MACHINE	96
3.28 INFUSION PUMP.....	100
3.29 SYRINGE PUMP.....	103
3.30 SURGICAL INSTRUMENTS.....	105

1. Overview

1.1 Introduction

Medical Equipment plays an important role in the Health Sector as far as improving the quality of services is concerned. There are different types of equipment ranging from basic to advanced e.g. Weighing scales, Suction machines, Sphygmomanometer, Nebulizer, Ultrasound machine, Electrocardiogram, Glucometer to mention but a few.

Medical Equipment is very expensive therefore there is need for the users to have knowledge and skills on how to operate and maintain it hence the need to come up with the User Training Manual to guide User Trainers while training others. This will help prolong the lifespan of equipment hence reduce the cost of repair and replacement.

User Trainers are responsible for training health workers in all health facilities on proper management of medical Equipment (Proper use and care) and they work hand in hand with the workshop technicians.

1.2 Background

Ministry of Health (MOH), Health Infrastructure Division established the User Training program way back in 1995 for carrying out in service training for Health workers. Initially, it targeted government Hospitals on “Proper use and correct handling of medical Equipment”. This followed the report of the National Advisory committee on medical equipment (NACME) after the evaluation and review of Proper use and correct handling of medical equipment done in March 1994.

It was observed that Health workers at times lack the knowledge, skills and experience for proper use of medical equipment leading to failure or malfunctioning of the equipment. After that report, Ministry of Health identified some health workers who were trained as trainers to handle medical equipment management issues. The trainings of equipment users were conducted in some Regional Referral Hospitals and district Hospitals. Again in 2010, Ministry of Health in conjunction with Japan International Cooperation Agency (JICA) Carried out a survey in some selected Health facilities and these were their findings: -

Most of the equipment was not utilized due to lack of knowledge to operate the equipment by the users

Some of the equipment was used at fault but the users were not aware of that

Other equipment was misused i.e. not used for the right purpose.

1.3 Objectives

These objectives are to guide the user trainers on the day to day training and they are:

-

- 1) To ensure that health workers are able to utilize all the equipment in their facilities properly without causing malfunction or failure.
- 2) To make sure that the right equipment is used for the right purpose.
- 3) The health workers are able to identify all the faulty equipment and report to the medical technicians for repair.
- 4) To encourage all health workers to carry out equipment inventory regularly to enable them to know what is available, what is faulty and what needs repair or replacement in their facilities.
- 5) To change the attitude of Health workers towards the safe use and care of medical equipment.

1.4 Stakeholders

- 1) Ministry of Health (MOH) CS and ND
- 2) Hospital Management
- 3) District Health Officers
- 4) User Trainers
- 5) Equipment Users
- 6) Development Partners
- 7) Health Infrastructure Department
- 8) Regional workshop managers

1.4.1 Roles of Ministry of Health

Clinical Services Department works hand in hand with the Development partners like JICA.

- 1) Policy formulation
- 2) Making working guidelines to be followed by user trainers and equipment users

1.4.2 Roles of Hospital Management

These are the administrators, Directors, Procurement officers, Accountants and Heads of departments

- 1) To identify equipment required
- 2) Allocate funds for procurement of equipment

- 3) Purchase the required equipment
- 4) Ensure the right equipment is procured
- 5) Organize training for Equipment users

1.4.3 Roles of District Health Officers

Their roles are the same as those for Hospital management

1.4.4 Roles of User Trainers

These includes the senior user trainers and the user trainers

- 1) To ensure that equipment users are trained
- 2) To make sure the equipment users are able to identify Equipment in their units by name
- 3) To make sure the equipment users are able to identify faulty Equipment and report to the medical technician
- 4) Help the hospital management to identify necessary Equipment for optimal operation of the facility
- 5) They participate in inventory keeping in the facilities regularly.
- 6) They participate in the procurement process of medical equipment for their health facilities.

1.4.5 Roles of Equipment Users

These are all the Health workers in the Health facilities e.g. nurses, doctors etc.

- 1) To ensure that all medical equipment is being utilized properly without causing any malfunction or failure.
- 2) To identify all the equipment in their units by name
- 3) To identify faulty equipment and report to the immediate in charge or user trainers who will contact the medical Technician.
- 4) To use the right equipment for the right purpose
- 5) To have positive attitude towards proper use and care for medical equipment
- 6) To carry out inventory keeping in their own units regularly without being reminded
- 7) To keep all equipment manuals in a safe place

Note:

Not all Technicians can repair medical equipment so only inform either medical Technicians or Bio medical Engineers.

1.4.6 Roles of Partners

These are different partners who come to support the Health facilities. In case of equipment to be donated to the facilities, they need to ask the Hospital management on what type of equipment that is needed.

1.5 Organization Structure

At the central level, the Commissioner Health Services (ACHS) (Curative) is responsible for User Training and he works hand in hand with the senior user trainers. They monitor, supervise and support the User Training activities.

User trainers are responsible for training the equipment users and also carry out support supervision in their areas of operation

1.5.1 Roles of National User Trainer: -

- 1) Trains the Regional and District User Trainers
- 2) Monitors the activities of Regional User trainers
- 3) Carries out support supervision to RUTs.
- 4) Handles administrative issues in the User Training Office.

1.5.2 Roles of Regional User Trainers: -

- 1) Trains the District User Trainers and Hospital User Trainers.
- 2) Trains the equipment users in their respect hospitals and catchment areas.
- 3) Carries out support supervision.

2. General Information

2.1 Introduction

This chapter describes the medical equipment user training manual that covers the target medical equipment and the basic contents to explain when conducting user training.

2.2 List of Target Medical Equipment covered in the Manual

No.	Name of Equipment	Manual No.	Revision No.	Date
1	Autoclave	ACL001	100-02	
2	Boiler	BOI001	100-02	
3	Tabletop Autoclave	TTA001	100-02	
4	Oxygen Cylinder	OXC001	100-02	
5	Oxygen Concentrators	OXY001	100-02	
6	Vacuum Extractor	VET001	100-02	
7	Operating Table	OPT001	100-01	
8	Nebulizer	NEB001	100-01	
9	Suction Machine	SUC001	100-01	
10	Sphygmomanometer (Blood Pressure Machine)	BPM001	100-01	
11	Weighing Scale	WSA001	100-01	
12	Resuscitator	RES001	100-01	
13	Recovery Bed	RVB001	100-01	
14	Pulse Oximeter	POM001	100-01	
15	MVA Set	MVA001	100-01	
16	Infant Warmer	IFW001	100-01	
17	Infant Incubator	INC001	100-01	
18	Hot Air Oven	HAO001	100-01	
19	Electrocardiogram	ECG001	100-01	
20	Fetal Doppler	FTD001	100-01	
21	Vertical Autoclave	VAC001	100-01	
22	Diathermy (Electric Surgical unit)	DTH001	100-01	
23	Glucometer	GLC001	100-01	
24	Patient monitor	PMN001	100-01	
25	Defibrillator	DEF001	100-01	
26	Ultrasound scanning machine	ULT001	100-01	
27	Delivery Beds	DEL001		

28	Infusion pump	INP009		
29	Syringe pump	SYP001		
30	Surgical instrument	SIN001		

2.3 General Management of Medical Equipment

All Medical Equipment **must** be: -

- 1) Entered in the Hospital Asset book
- 2) Engraved with the hospital name, unit number and name before issued to units/wards.
- 3) Entered in the inventory book, and updated regularly, monthly by unit in charges, quarterly by SPNO and two years by Hospital Administrator.
- 4) Handed over to the Health worker on the next shift.
- 5) Kept clean and covered with clean cloth/mackintosh when not in use.
- 6) Kept in labeled, zoned area.
- 7) Serviced every six months or as recommended by the manufacturer.
- 8) Repaired by qualified medical technicians.
- 9) Operated by trained personnel.
- 10) User manuals and guidelines must be accessible to all users.
- 11) Faulty equipment should be reported to immediate supervisor or technicians
- 12) Equipment with wheels must be oiled regularly.
- 13) The equipment that comes in contact with body fluids must be decontaminated before cleaning. Users should observe infection, prevention/control standards all the time.
- 14) All Electrical equipment must use the stabilizers
- 15) Equipment not in use must be, labeled, wrapped, kept and checked regularly.
- 16) Avoid using hard water for sterilization, and other procedures.
- 17) Obsolete equipment should be written off from inventory book and taken away from the unit.
- 18) All Equipment must be kept clean, complete i.e. by having all parts/accessories in place and in good working condition.
- 19) Ensure safe storage of the medical equipment.
- 20) . Formula for mixing JIK: If you use 6% JIK diluted to 0.5% you can use the following formula:

$$\text{Formula for Mixing JIK} = \left(\frac{\text{Given Concentration}}{\text{Required Concentration}} \right) - 1$$

e.g. For each liter of JIK, 11 liters of water should be added.

For example, to make 1 liter of 6% JIK 0.5%, just add 11 liters of water.

$$JIK = \left(\frac{6\% \text{ of } JIK}{0.5\% \text{ of } JIK} \right) - 1 = \left(\frac{6\%}{0.5\%} \right) - 1 = 12 - 1 = 11$$

or

To dilute 1 liter of 3.8% JIK to 0.5%, simply add 6.5 liters of water.

$$JIK = \left(\frac{3.8\% \text{ of } JIK}{0.5\% \text{ of } JIK} \right) - 1 = \left(\frac{3.8\%}{0.5\%} \right) - 1 = 7.5 - 1 = 6.5$$

or

To dilute 1 liter of 3.5% JIK to 0.5%, simply add 6 liters of water.

$$JIK = \left(\frac{3.5\% \text{ of } JIK}{0.5\% \text{ of } JIK} \right) - 1 = \left(\frac{3.5\%}{0.5\%} \right) - 1 = 7 - 1 = 6$$

Since this is proportional,

In the case of 6%, the same applies if 11 cups of water are added to 1 cup of JIK.

In the case of 3.8%, it means that 6.5 cups of water should be added to 1 cup of JIK.

In the case of 3.5%, it means that 6 cups of water should be added to 1 cup of JIK.

21) Medical equipment is generally designed to operate stably up to a power supply voltage variation of $\pm 10\%$. 216-264V. The standard power supply voltage and frequency of Uganda is 240V50HZ. However, the power situation in Uganda is constantly changing and not stable. As a result, failures of medical equipment due to power supply fluctuations have frequently occurred. To protect medical equipment, user trainers need to explain the following when training:-

- 1) Use of stabilizers.
- 2) Reduce the use of extension cables.
- 3) Reduce the use of adapter plugs.
- 4) After use, remove the plug from the socket.
- 5) In the event of a power failure, remove the plug from the socket whenever possible.
- 6) Stabilizers are not widespread in Uganda, so we will address them in 2-
- 7) The following describes how to refer to lighting (bulb or fluorescent light) as a measure of voltage fluctuation:

- When it becomes low, it becomes abnormally dark or does not light. In the case of a fluorescent lamp, flickering occurs.
 - When it gets higher, it gets brighter. In case of a light bulb, it may break.
- 8) Explain that if a conversion plug or extension cable that does not match the plug of the device is used, there is a risk of heat generation or ignition due to poor contact.

2.4 Uganda National Infection Prevention and Control Guideline

2.4.1 Sterilization:

Sterilization is the process of destroying all organisms including spore forming organisms. It is indicated for instruments used in high-risk procedures and those that come in direct contact with the blood stream or normally sterile tissues (Spaulding 1939). It is important to remember that the success of sterilization process depends on proper cleaning, drying, and packing of equipment. The process requires time, contact, temperature and, with steam sterilization, high pressure. Sterilization can be achieved by physical agents, high-pressure steam (autoclave), dry heat (oven) or chemical sterilizers.

2.4.2 Sterilization by Autoclaving

High-pressure steam sterilization is the most common and widely used method for processing re-usable heat stable medical devices. It is inexpensive and effective method of sterilization but is also the most difficult to do correctly (Gruendemann and Mangum 2001).

- 1) Double wrap instruments in freshly laundered cloth or paper using envelope or square wrap technique
- 2) Arrange instrument packs on an autoclave cart or shelf. Place in autoclave chamber to allow free circulation and penetration of steam to all surfaces
- 3) Wrapped items should be sterilized while observing the contact time, temperature and pressure as specified by the manufacturers
- 4) Allow packs to dry completely before removal.
- 5) Place sterilized packs on a surface padded with paper or fabric to prevent condensation.
- 6) Allow packs to reach room temperature before storing
- 7) Record sterilization conditions (time, temperature and pressure) in logbook
- 8) Each load should be monitored with mechanical/automatic (time, temperature and pressure) and chemical (test strips) indicators
- 9) Autoclaves should be tested daily with an air-removal test (Bowie-Dick Test) to ensure air removal
- 10) Autoclaves should be tested every six months or when machine has been repaired using a commercially available biological indicator
- 11) The table below shows the temperature and time for standard autoclaving.

Temperature	Time (Minute)
115°C	30min.
121°C	20min.
126°C	15min.

2.4.3 Sterilization by Dry Heat Oven (harmonize with 2004 infection control guidelines)

- 1) Place metal instruments or glass syringes in a metal container with a lid. Close the lid.
- 2) Do not put plastic or rubber instruments or equipment in the dry heat oven unless the manufacturer's instructions say it is safe, as they will melt
- 3) Place covered containers in oven and heat 160 degrees Celsius
- 4) Begin timing after 160 degrees Celsius is reached and maintain temperature for 2 hours
- 5) After cooling, remove containers and store
- 6) The table below shows the temperature and time for standard heat sterilization.

Temperature	Time (Hour)
135-145°C	3-5
160-170°C	2-4
180-200°C	0.5-1

2.4.4 Chemical Sterilization

- 1) Prepare fresh solution of chemical sterilant as prescribed by the manufacturer, or check to be sure solution is not out of date
- 2) Submerge cleaned and dried items for at least 10 hours in 2 -4% glutaraldehyde solution or at least 24 hours in 8% formaldehyde solution, completely covering all items
- 3) Remove items from the chemical solution using sterile forceps/pickups
- 4) Rinse items thoroughly with sterile water to remove all traces of chemical sterilant
- 5) Use the item immediately or place it in a sterile, covered container

2.4.5 Handling and Storage of High-Level Disinfected instruments (HLD) and Sterile Instruments

High-Level Disinfected instruments:

- 1) Must be handled with high-level disinfected or sterile instruments (e.g., when removing out of the boiler or chemicals)
- 2) Must be stored in high-level disinfected or sterile containers

- 3) If not in use cover container for up to one week (the cover as well as the container must be HLD)
- 4) Storage in a closed cabinet is preferred, in an area where dust and lint is minimized
- 5) All stored instrument packs or containers must be clearly labeled with the date of processing and expiry.
- 6) Re-disinfect after one (1) week.

2.4.6 Sterile Instruments

- 1) Wrapped sterile packs should be stored in a dust and pest free environment (Storage in a closed cabinet is preferred)
- 2) Wrapped sterile packs of instruments, or instruments in a sterile container with a tight-fitting lid, can be stored for:
 - up to one week on an open shelf
 - up to one month if placed in a plastic container or in a sealed plastic bag
- 3) All stored instrument packs or containers must be clearly labeled with the date of processing and expiry

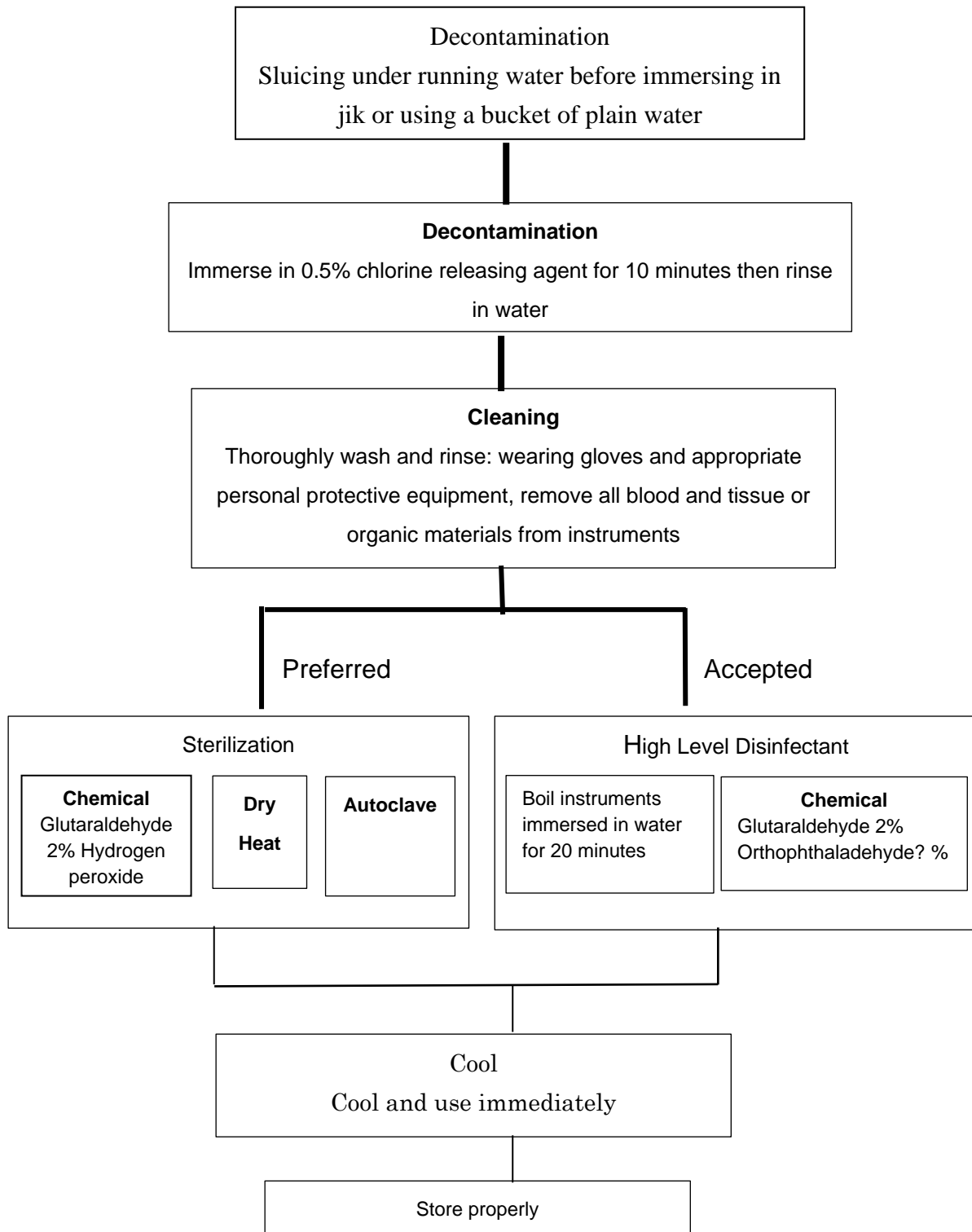
Equipment or material and recommended method or procedure for sterilization:

Equipment/material	Method/Procedure	Remarks
Glass, powder, metals, creams, optic instruments, waxes, petroleum jelly	Dry heat using hot air oven	Observe temperature and holding time, according to manufacturer's instructions
Porous materials, e.g. wrapped surgical instruments, gauze. Surgical gowns, cotton mops, theatre linen and dental instruments	Moist heat (Autoclaving)	Regularly check for efficiency
Intravenous fluids preparation (I.V. fluids)	Should be autoclaved or bacteria filtered	Observe strict hygiene and test for pyogens.
Endo-tracheal tubes	Ethylene oxide gas	Sterilization is done in industries

Note:

Some equipment such as endo-tracheal tubes and other plastics are disposable and should be used once and discarded.

Key steps in Processing contaminated Instruments and other items



NB: While formaldehyde is acceptable for sterilization or HLD, it is not recommended due to its strong side effects (toxic vapors, skin/eye/respiratory tract irritation, carcinogenicity, etc.)

For more details information please refer to the following website:

<http://library.health.go.ug/publications/leadership-and-governance-governance/guidelines/uganda-national-infection-prevention>

2.5 Classification of condition for Medical Equipment

The MOH manages data on the operation status of medical equipment in all health facilities in the country through an inventory system. Under the system, inventory data is collected through the regional workshop and sent to the Infectious Disease Institute (IDI) host computer. IDI developed a New Order for Management Anything Data (NOMAD) system for processing the data for use in any part of the country through the internet. The operation status for medical equipment is categorized in six levels from A to F as follows:

A: Good and in use.	D: In use but needs replacement.
B: Good but not in use.	E: Out of order but repairable.
C: In use but needs repair	F: Out of order, dispose off

CLASSIFICATION OF CONDITION FOR MEDICAL EQUIPMENT BY COLOR CODE		
A	GOOD AND IN USE	NO PROBLEM
B	GOOD BUT NOT IN USE	USER TRAINING NEEDED
C	IN USE BUT NEEDS REPAIR	MAINTENANCE NEEDED
D	IN USE BUT NEEDS REPLACEMENT (OLD OR OBSOLETE)	PLAN FOR DECOMMISSION- ING/DISPOSAL
E	OUT OF ORDER BUT REPAIRABLE	MAINTENANCE NEEDED
F	OUT OF ORDER AND SHOULD BE REPLACED (CAN NOT BE REPAIRED, NO SPARE, OLD OR OBSOLETE)	DISPOSE

3. MEDCAL EQUIPMENT USER TRAINING MANUAL

3.1 AUTOCLAVE

1. Definition

An Autoclave is a medical equipment which uses steam under pressure for sterilization of instruments and other materials (e.g. linen, dressings).

2. Types

2-1: Electrical (fixed or portable)

2-2: Non-Electrical



3. Parts

3-1: Main body

- 1) Slotted equipment tray – is the tray with holes that allows heat to travel evenly.
- 2) Rack – is used for supporting the sterilizing drum/basket,
- 3) Knobs/bolts/wing nuts which are used for opening and tightening the lid
- 4) Inner Chamber – open space for loading the materials to be sterilized.
- 5) Inner Containers or Baskets - is where materials are packed and placed in the chamber
- 6) Stand - is metallic for supporting the container.
- 7) Water level indicator - shows water level.

3-2: Lid: Is a top cover of the autoclave with:

- 1) Handle (for lifting the lid and placing it back on the body)
- 2) Temperature/pressure gauge (for monitoring steam pressure and temperature)
- 3) Pressure release valve - (for removing cold air trapped in the equipment as well as removing excess pressure/steam at the end of sterilization).
- 4) Security valve/rescue valve/safety valve – (removes excess steam during the

process of sterilization).

- 5) Gasket- aids proper closing thus preventing escape of steam.

4. Accessories

- 1) Source of Heat - paraffin/charcoal/gas stove – nonelectrical.
- 2) Autoclave tape/Sterilizing tape
- 3) Timer/wall clock/watch for timing sterilization
- 4) Cable and Top plug

5. Preparation

- 1) Make sure it is put on a firm leveled surface.
- 2) Check water level in the chamber
- 3) Make sure the autoclave is clean inside and outside, and in good working condition.
- 4) Prepare the materials to be sterilized.
- 5) Put the sterilizing tapes on the materials.
- 6) Ensure availability of power source/heat.
- 7) Add water (distilled/Rainwater) to the level indicator or according to the operating guidelines.
- 8) Load items correctly to ensure successful sterilization.

6. Operation

- 1) Load the autoclave with sterilizing basket, drum or packs.
- 2) Put on the lid or close the door tightly.
- 3) Put on the source of heat or switch on power socket, stabilizer and equipment.
- 4) When the gauge shows the recommended temperature and pressure, maintain the heat and keep the temperature and pressure constant for the period of sterilization. (For example, 1.4 kgs/cm² 135°C – 10 minutes, 1.2 kg/cm² 121°C – 20 minutes).

7. Care

7-1: Immediate Care

- 1) Switch off the power from the equipment, stabilizer and main socket,
- 2) Open the steam valve and let the autoclave reduce to “0” pressure before opening

the lid or door.

- 3) Unscrew the door handle/bolts to open the lid or door.
- 4) Using sterile sterile forceps pick out the materials and store in a sterile drum / Shelves.
- 5) Drain the water from the autoclave and leave it dry – (If it is rainwater or tap water change daily and distilled water change weekly).
- 6) After sterilization excess pressure should be released immediately, so that the items can dry in the autoclave.

7-2: Routine Care

- 1) Autoclaves are designed for various types of loads but the principles are the same.
E.g. non-porous loads: (materials which do not contain air like a kidney dish).
- 2) Do not use steel wire for scrubbing but instead use vim when necessary.
- 3) Use a clean cloth for cleaning the Autoclave.
- 4) Change gasket when worn out or every year.

Note:

- 1) Auto claves should not be left unattended to when in use.
- 2) All instruments and other equipment used to perform surgery must be sterilized properly for use.
- 3) When power goes off during the procedure, switch off from the main source.
Restart the procedure if power comes back.
- 4) Check the following for damages:-
 - a) Lid opens and closes easily. Gasket for damages.
 - b) All valves open/close easily and are not leaking
 - c) Pressure gauges, safety valve, pressure relief valve are working well.
- 5) Ensure it is clean inside and outside and in good working condition.
- 6) Cold air affects the effectiveness in killing micro-organisms thus rendering sterilization inadequate.
- 7) After sterilization allow the machine to cool for 20 minutes before starting another procedure or cycle.
- 8) Packs or wrapped items should not be too tightly wrapped because it will prevent instruments from reaching temperature sufficiently to kill all microorganisms.
- 9) The manual should be available.

3.2 BOILER

1. Definition

Boiler is Medical equipment used for high level disinfection of instruments.

2. Types

2-1: Fixed (Electrical)

2-2: Portable (Electrical or Non-electrical)



3. Parts (Electrical)

- 1) Body
- 2) Lid with handle
- 3) Chamber
- 4) Slotted equipment tray with carrying handle
- 5) Heating element
- 6) Cable with top plug
- 7) Drainage tap
- 8) Rubber stand
- 9) On and Off Switch

4. Accessories

- 1) Source of heat – Charcoal/gas/stove
- 2) Timer/or wall clock

5. Preparation

- 1) Put the boiler on Table or firm leveled surface.
- 2) Ensure that the Boiler is clean in and outside.
- 3) Ensure that the Instruments to be sterilized are clean and dry.
- 4) Pack the instruments properly in the boiler well immersed in water.

- 5) Close the Lid properly.

6. Operation

- 1) Switch on the power or put on the source of heat.
- 2) Regulate the temperature knob to 100° C.
- 3) When the water starts boiling time for 20minutes

7. Care

7-1: Immediate Care

- 1) After twenty minutes switch off the power and unplug
- 2) Drain out water from the boiler, if you have nowhere to put your instruments, leave them inside.
- 3) Use sterile chaetal forceps to remove the instruments.

7-2: Routine Care

- 1) Daily cleaning of the Boiler
- 2) Change water daily or more than once a day if necessary
- 3) Check for the functionality of the equipment and report any fault to the immediate supervisor.
- 4) Cover with a clean cloth when not in use
- 5) Leave the boiler dry when not in use or when faulty.
- 6) Clean the boiler daily with soap and rinse with clean water.
- 7) Use rain or clean tap water (change rainwater every after two days and tap water change it daily).
- 8) Keep in a designated area.

Note:

- 1) Do not over boil the instruments.
- 2) Do not leave the instruments in water after disinfection.
- 3) Incase power goes off during the procedure remember to switch off the boiler and if power comes back restart the procedure.
- 4) Never switch on the equipment without ensuring that there is enough water.
- 5) Switch off and unplug the boiler from the socket when not in use.
- 6) Don't leave the Boiler unattended to.
- 7) Do not add water or remove instruments before the procedure is complete.
- 8) Do not over pack the boiler.

3.3 TABLETOP ELECTRICAL AUTOCLAVE

1. Definition

Tabletop Electrical Autoclave is medical equipment that uses electricity to sterilize wrapped and unwrapped instruments and other related items using steam under pressure.

2. Types

2-1: Portable Horizontal designs (Manual Control type)



2.2: Electrical Tabletop (Digital Control type)





3. Parts

- 1) Body (main)
- 2) Water reservoir with cover for filling H₂O into autoclave – (inside it is air Jet – to expel cold air; Safety valve – to expel excess pressure, Reservoir water drain valve)
- 3) Electric cables with top plug.
- 4) On and Off Switch
- 5) Control panel with knobs for different programs and light indicators.
- 6) Pressure gauge
- 7) Door cover with gasket
- 8) Micro Door Switch
- 9) Window display
- 10) heating element with a sensor
- 11) Chambers
- 12) Sterilizing tray holder
- 13) Slotted trays

3-1. Control Panel

- 1) On/Off Switch
- 2) Power indicator
- 3) Heating, sterilizing and drying indicators
- 4) Pressure gauge
- 5) Timer
- 6) Manual knobs (Multi-purpose)

3-2 Inside/Chamber

- 1) Slotted tray
- 2) Heating element
- 3) Water level indicator
- 4) Tray racks

3-3. Accessories

- 1) Cable and Top plug
- 2) Stabilizer
- 3) Sterilizing tapes

4. Preparation

- 1) Make sure it is put on a firm leveled surface.
- 2) Make sure the autoclave is clean inside and outside, and in good working condition.
- 3) Prepare the materials to be sterilized.
- 4) Put the sterilizing Tapes on the materials.
- 5) Ensure availability of power source/heat.
- 6) Add water (distilled/Rainwater) to the level of indicator or according to the operating guidelines.
- 7) Load items correctly to ensure successful sterilization.

5. Operation

- 1) Connect to the power source and ensure it is well connected.
- 2) Switch on power.
- 3) Press or turn knob to fill in water into chamber.
- 4) Select the temperature drying time and item to be sterilized.
- 5) Press start and allow the process to continue until completion.

6. Care

6-1: Immediate care

- 1) Switch off from the equipment, stabilizer and the main source and unplug.
- 2) Allow it to cool by releasing steam from Autoclave.
- 3) Use sterile cheadle forceps for removing instruments from the Autoclave

6-2: Routine care

- 1) Daily dump dust with soapy water, rinse in clean water and dry it.
- 2) Ensure the gasket is clean, smooth and fitting well.

- 3) The trays inside should be cleaned, interior chamber kept clean to avoid stains on the metal.
- 4) Keep the surrounding clean.
- 5) Disconnect the electric cable from the main source when not in use then fold it properly.

7. Weekly care

- 1) Once a week clean the jet to ensure that temperature inside the chamber rises properly. It is necessary to keep the air jet clean because a dirty air jet will prevent indicator strip from changing color and causes spore tests to fail.
- 2) Clean and descale the chamber copper tubes and the reservoir using chamber brite.

8. Periodically

Once every month clean and check the safety valves. Replace the door gasket every 12 months or as needed Once a year inspect locking device for excessive wear

Note:

- 1) Don't use steel wool, steel brush or bleach as this can damage the chamber and trays.
- 2) Lubricate the door with WD 40.
- 3) Preferably use distilled water or low mineral water for sterilization.
- 4) Should be used by trained person.
- 5) Do not leave the autoclave unattended too while operating.
- 6) Do not over pack the autoclave.
- 7) When power goes off before the procedure is over, re-start.
- 8) Make sure autoclave is cleaned at least once a month.
- 9) Make sure autoclave is serviced four times in a year.
- 10) Instructions should be followed carefully to prevent serious injuries and damage to the items.
- 11) Availability of the manual should be in an understandable language.

3.4 OXYGEN CYLINDER SET

1. Definition

An Oxygen Cylinder set is a medical equipment used for storing pressurized Oxygen to be used by patients who are in need.

2. Parts

Has two main parts:

2-1: Head (Manometer)

2-2: Body (steel cylinder)



2.1: **Head (Manometer):** Consists of

- 1) Flow meter with bobbin
- 2) Pressure gauge
- 3) Connecting nut
- 4) Oxygen Inlet
- 5) Regulator
- 6) Cylinder valve
- 7) Oxygen Outlet

2.2: **Body: Cylinder (steel)**

- 1) Black and white is the standard color/at times other colors can be used depending on the country.

3. Accessories

- 1) Cylinder stand
- 2) Humidifier bottle
- 3) Tubing's
- 4) Face masks in different sizes or Nasal catheter
- 5) Spanner or oxygen key
- 6) Oxygen carrier
- 7) Cylinder valve cap

4. Preparation

- 1) Identify the right cylinder (observe color code – black & white).
- 2) Make sure the oxygen cylinder set is clean, complete and in good working condition and filled by checking the gauge.
- 3) Check that the Humidifier bottle has distilled/rainwater to the required level.
- 4) Fit the manometer to the cylinder by tightening the connecting nut clockwise using a spanner.
- 5) Open the cylinder valve to ensure there is oxygen; at the same time this cleans the air outlet.
- 6) Ensure that the flow meter is upright.
- 7) Connect Humidifier bottle to the flow meter.
- 8) Explain the procedure to the patient/relative

5. Operation

- 1) Connect the nasal catheter/facial mask from the Humidifier bottle to the patient.
- 2) Regulate the oxygen supply in the flow meter using a bobbin according to the prescription.
- 3) The duration depends on patients' condition.
- 4) Monitor the patient until the condition stabilizes (using pulse oximeter).

6. Care

6-1: Immediate Care

- 1) After use close flow meter regulator and cylinder valve.
- 2) Remove face mask/nasal catheter from the patient.
- 3) Disconnect, discard/decontaminate the nasal catheter/face mask.
- 4) Then open the flow meter regulator to release out any excess oxygen held in the system when the hissing sound stops close the flow meter.

6-2: Routine care

- 1) Check whether the Oxygen cylinder set is in good working condition.
- 2) Daily dump dusting using soapy water, rinsing with clean water and leave it dry.
- 3) Check humidifier bottle if it has distilled water ($\frac{2}{3}$) between maximum and minimum or required level.
- 4) Distilled water to be changed weekly, then tap water changed daily.
- 5) Check tubing for cracks and deterioration.
- 6) Ensure the right key or spanner is available.
- 7) If empty, label and take to the store for refill.
- 8) Have a standby full cylinder
- 9) Check oxygen cylinder for damage or cracks annually

7. Precaution

- 1) No smoking/flames should be allowed around the cylinder during operation because oxygen supports combustion.
- 2) Do not grease or oil as it may promote explosion.
- 3) Do not allow pressurized oxygen to come into contact with the skin as it causes burns.
- 4) Use proper clear simple signs showing danger) E.g:



or



Note

- 1) Consumables like face masks, nasal catheter should be discarded/changed regularly.
- 2) Ensure that there is no leakage of oxygen.
- 3) Make sure that there is a right manometer for the right cylinder.
- 4) Make sure that the filter in the humidifier bottle is cleaned regularly.
- 5) Ensure that oxygen key or spanner are easily accessible.
- 6) Face mask delivers up to 100% of Oxygen.
- 7) Nasal catheter delivers only 60% of Oxygen.
- 8) Make sure that oxygen cylinders flop is checked and cleaned regularly in order not to block normal air inlet to the humidifier bottle.
- 9) An empty cylinder must be well labelled with the word “empty” and remove away to be taken for refill.

3.5 OXYGEN CONCENTRATORS

1. Definition

An Oxygen Concentrator is a Medical Equipment which has the mechanism of capturing air from within the surrounding or atmosphere and concentrates the oxygen to provide patients with reliable oxygen.

2. Types: There are two: Domestic and Commercial

2-1: Domestic type i.e. has one Humidifier bottle and one flow meter basically for one patient use at a time and can provide up to 5 liters of Oxygen.

2-2: Commercial type i.e. has two Humidifier bottles and two flow meters can serve two patients at the same time and can provide up to 10 liters of oxygen.

Domestic



Commercial



3. Parts

- 1) The Body: This comprises of the external and internal parts.
- 2) On/Off Switch: switch on and off the concentrator.
- 3) The flow meter: Is calibrated glass with amount of O₂ measures in litres. This measures the amount of oxygen to be administered to the patient.
- 4) Oxygen Regulator: It regulates the amount of oxygen to be administered to the patient which is indicated by the bobbin in the flow meter.
- 5) Oxygen Outlet: This brings oxygen direct from the Humidifier bottle to the patient.
- 6) The Vent: This allows in and out Air of the concentrator thus cooling the toner system.
- 7) Filter: This covers the Air inlet vent and filters Air which enters the concentrator.

- 8) Concentrator Meter: This indicates the hours the concentrator has served and when it is due for service e.g. 5000 hours. (depend on Model)
- 9) Casters: These are used for movement.
- 10) Oxygen inlet-brings oxygen to humidifier bottle.

4. Accessories

- 1) Cable with a Top Plug
- 2) Stabilizer
- 3) Tubing
- 4) Face mask or nasal catheters
- 5) Connectors
- 6) Filters
- 7) Humidifier Bottle: This contains distilled water which moistens Oxygen since dry Oxygen irritates and ulcerates the airway, if given for long damages the eye retina.

5. Preparation

- 1) Make sure equipment is clean, complete and in good working condition.
- 2) Pour distilled water in the humidifier bottle.
- 3) Connect the long tubing to the oxygen outlet on humidifier bottle
- 4) It should stand in upright position, 30cm away from the wall and 15cm from the ground. This is to ensure good circulation of Air to the equipment.
- 5) Prepare the patient in a comfortable position.

6. Operation

- 1) Fix the plug in the socket and switch on from the socket, stabilizer and concentrator, then it will make an alarm which will go off after some few seconds. This indicates that the concentrator has begun to absorb Air from the surrounding (for the domestic type).
- 2) Connect the face mask/nasal catheter to the patient.
- 3) Adjust the Oxygen flow to the prescribed rate e.g. 0.5-2 liters per minute (infant); 2-4 liters per minute (Adults).
- 4) Continue monitoring the patient until the condition stabilizes, can use pulse oximeter to confirm whether a patient has received enough O₂ - 99%.

7. Care

7-1: Immediate care

- 1) After the procedure remove the nasal catheter/face mask from the patient.
- 2) Switch off from the equipment, stabilizer then from mains.
- 3) Unplug from the socket and fold the cable properly.

- 4) Disconnect the tubing, mask/catheter and decontaminate.

7-2: Routine care

- 1) Daily dump dusting of the equipment with a damp cloth using soapy water.
- 2) Inspect the gross particle filter for any dirt. If any dirt, clean as follows: -
 - Detach the filter from the concentrator and replace with a clean one.
 - Wash the filter with soapy water, rinse in clean water and leave to dry do not squeeze.
- 3) Switch on to confirm if it is in good working condition.
- 4) Check the number of hours on the concentrator meter with your log book.
- 5) When not in use; unplug from the socket and fold the cable to avoid dragging on the floor.
- 6) Use distilled water in the humidifier bottle and always change it weekly to avoid clogging of the bottle and in case of rain or tap water change it daily.

Note:

- 1) The oxygen concentrator uses electricity.
- 2) Do not use any form of heat to dry the filter as it will be damaged.
- 3) The room should not be crowded with people as this interferes with air circulation to the equipment.
- 4) Avoid using domestic type of concentrator for more than one patient at a time.
- 5) Avoid flames/oils near the concentrator as Oxygen supports combustion.
- 6) Use clear signs of danger (diagram)
- 7) The intake filter needs to be cleaned as it is replaced.



3.6 VACUUM EXTRACTOR

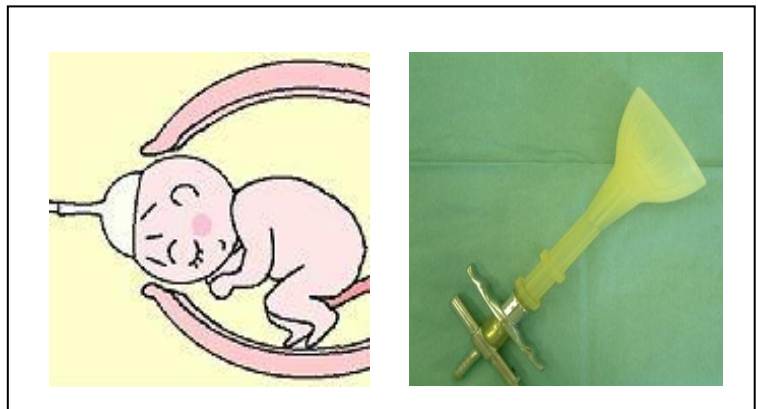
1. Definition

A Vacuum Extractor is a medical equipment used to aid the safe delivery of babies during difficult labor e.g. delayed 2nd stage.

2. Types

2-1: Manual

2-2: Electrical



3. Parts

3-1: Parts (Electrical type)

- 1) Body
- 2) On and off switch
- 3) Electric cable and top plug
- 4) Vacuum bottle(s)
- 5) Pressure gauge
- 6) Vacuum Regulator
- 7) Vacuum caps
- 8) Tubing with hook and traction handle
- 9) Pressure release valve
- 10) Empty bottle with metal inside

3-2: Parts (Manual Type)

- 1) Rubber plug with stainless inlet/outlet tubes
- 2) Hand vacuum pump
- 3) Vacuum bottle
- 4) Vacuum gauge

- 5) Rubber Vacuum tubes
- 6) A traction handle with hook (manual)
- 7) Vacuum Release valve
- 8) Silicon rings with chain (manual)
- 9) Vacuum caps in different sizes

4. Preparation

4-1: Preparation Manual Type

- 1) Make sure you have a sterile and complete set
- 2) Assemble the parts and test the equipment
- 3) Make sure that you know how to connect it.
- 4) Connect the short tube from the vacuum pump to the vacuum bottle.
- 5) Attach the vacuum pump to the tubing.
- 6) Place the Vacuum extractor on the trolley.

4-2: Preparation Electrical Type

- 1) Connect the tubing to the Bottle

5. Operation

5-1: Operation (Electric): -

- 1) Connect to the source of power, and then switch on from the power source and on the stabilizer, then on the machine.
- 2) Regulate according to operation.

5-2: Operation (Manual): -

- 1) Connect the long tube from the vacuum bottle to the suction cup.
- 2) Follow Doctor's instruction

6. Care

6-1: Immediate care

- 1) Switch off power from the machine, stabilizer and from the mains.
- 2) After use, disconnect the tubing's, caps, silicon chain, and bottle, decontaminate, wash with soapy water then rinse in clean water and dry.
- 3) Store the stand, vacuum bottle and pump in a safe place

6-2: Routine care

- 1) Make sure the caps, long and short tubing's, chains and the traction handle are dried, packed in a drum and taken for sterilization.

2) Make sure it is sterile, complete and in good working condition.

Note:

- 1) The pump and the gauge should only be wiped with a damp cloth.
- 2) Must be operated by two people.
- 3) Lubricate the piston of the pump regularly.
- 4) The pump should not be sterilized or boiled.
- 5) Apply only when the presentation is vertex.
- 6) There must be no cupuut.
- 7) The cervix must be fully dilated.
- 8) Never use it in premature delivery.

3.7 OPERATING TABLE

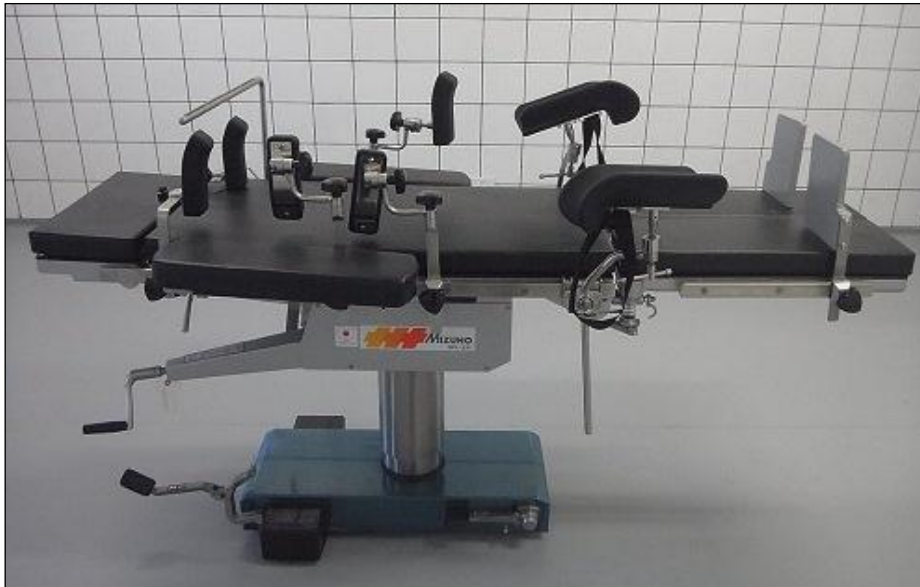
1. Definition

An Operating table is a medical equipment which the patient lies on during surgical operation.

2. Types

2-1: Electrical

2-2: Manual



3. Parts and functions

- 1) Base frame – contains hydraulic oil
- 2) Hydraulic pedal used for raising and lowering the table.
- 3) Wheel castors used to move the table from place to another.
- 4) Manual floor lock – used to keep the table stationed
- 5) Fixed wheel – to rotate the table in different directions.
- 6) Screen rods – It helps hang a piece of cloth to prevent the patient from seeing the operation
- 7) Side Supporters prevent the patient from falling down
- 8) Arm rest with fasteners: – To support the arm of the patient
- 9) Drive handle used – tilting the bed in the different positions. Example: side tilt, Head position, leg section.
- 10) Mattress with fasteners: For the patient to lie on during operation.
- 11) Knee crutches – for lithotomy position
- 12) Cylinder – for conveying hydraulic oil to different parts of the bed.

13) Foot/shoulder supporters

4. Preparation

- 1) Ensure the bed is clean, complete and in good working condition.
- 2) Disinfect the table before use.
- 3) Cover with a clean and dry mackintosh.

5. Operation

- 1) Cover the table with a sterile sheet
- 2) Put the patient ready for procedure
- 3) Adjust to a required position when necessary.

6. Care

6-1: Immediate Care:

- 1) After use, decontaminate for 10 minutes with jik 0.5%, clean with soapy water and rinse with clean water and leave it to dry.
- 2) Check that there are no stains on the table.

6-2: Routine:

- 1) Leave the table dry and ready at all times covered with dry mackintosh.
- 2) Check for the functionality of the movable parts.
- 3) Ensure that the table is always complete

7. Maintenance

- 1) Put hydraulic oil when necessary by the technician.
- 2) Regular servicing with WD40 in joints.

Note:

- 1) Never put a patient on the table which is not disinfected.
- 2) The table must be operated by trained personnel.
- 3) Never pour water or Jik on the table when cleaning.
- 4) Never put a patient on a wet bed.

3.8 DELIVERY BED

1. Definition:

Delivery Bed is a medical equipment on which mothers lie during delivery.

2. Type:

2-1: Metallic



3. Parts:

- 1) Top with Mattress which is fixed or movable.
- 2) Metallic Frame/Stand
- 3) Hand support
- 4) Leg support
- 5) Adjustment handle
- 6) Drip stand provision
- 7) Shoulder support

4. Preparation:

- 1) Ensure that the bed is clean, complete and in good working condition
- 2) Should be in well ventilated room near running tap water
- 3) Bed should be on a firm surface
- 4) Put the mackintosh on the bed

5. Operation:

- 1) Instruct the Mother to climb the bed.
- 2) Adjust the bed according to the type of delivery.

6. Immediate care:

- 1) Decontaminate the bed, clean with soapy water, rinse with clean water and leave

it dry.

- 2) Cover the bed with dry mackintosh ready for the next patient

7. Routine care:

- 1) Check that the bed is clean, complete and in good working condition.
- 2) Daily dump dusting with soapy water, rinse and leave it dry.
- 3) Cover with dry Mackintosh when not in use.
- 4) Handover in every shift verbally and written
- 5) Report any fault to the technician.
- 6) Service every 6 months.
- 7) Ensure it is entered in inventory book.

Note:

- 1) Never admit a mother on a bed which is not clean.
- 2) Never pour water or Jik on a delivery bed as it may cause rusting and make the bed stuck in one position.
- 3) Movable parts and the nuts should be oiled regularly.

3.9 NEBULIZER

1. Definition

A Nebulizer is a medical equipment used to administer medication in form of mist to a patient who has respiratory distress.

2. Types

2-1: Electrical



3. Parts

- 1) Main Body
- 2) Air inlet/vent
- 3) Filter
- 4) Compressor Unit
- 5) Rubber stands
- 6) Air outlet
- 7) On and off switch
- 8) Handle

4. Accessories:

- 1) Medicine pot/chamber
- 2) Cable with top plug (Electrical)
- 3) Patient mask (Adult & Infant)
- 4) Rubber tubing (Electrical)
- 5) Mouthpiece
- 6) Stabilizer
- 7) Drugs

5. Preparation

- 1) Ensure the equipment is clean, complete and in good working condition.
- 2) Have the drugs at hand.
- 3) The patient's file should be at hand/prescription.

6. Operation

- 1) Bring the equipment next to the patient.
- 2) Prepare the drug according to the Doctor's prescription (salbutamol in normal saline)
- 3) The patient should be in sitting up position, well supported in a chair or on a bed.
- 4) Plug in the socket
- 5) Switch on from the main, stabilizer then on the Nebulizer.
- 6) Place the face mask over the patient's mouth and nose and place the strap over her/his head.
- 7) Ensure that medicine pot is in upright position
- 8) Instruct the patient to breath in and out as normal.
- 9) When the Nebulizer starts to splutter the treatment is complete, this will take between 10-20 minutes. A small amount of solution may be left in Nebulizer at this stage, but this is normal.

7. Care

7-1 Immediate Care

- 1) Remove the mouthpiece/mask from the patient.
- 2) Switch off the Nebulizer, stabilizer then the main switch and un-plug.
- 3) Disconnect Nebulizer port from the tubing's (depending on the type).
- 4) Wash the Nebulizer pot in warm soapy water and rinse thoroughly with clean water after every use.
- 5) Reconnect the Nebulizer port to the tubing and blow air from the compressor unit through it for a few seconds.
- 6) Decontaminate the patient's mask, wash with soapy water and rinse with clean water
- 7) Leave the mask to dry
- 8) Disconnect the Nebulizer port from the tubing and allow it to dry completely.

7-2 Routine Care

- 1) Once a week clean the Nebulizer port with disinfectant and rinse with clean water and dry.
- 2) Check the tubing regularly for cracks and kinking.

- 3) Cover with clean cloth or in their boxes when not in use.

Note:

- 1) Do not use a brush to clean the Nebulizer port as it may damage it.
- 2) Tubing should be replaced after every six months/whenever necessary.
- 3) Nebulizer port should be replaced after every four months/whenever necessary.

3.10 SUCTION MACHINE

1. Definition

A Suction Machine is a medical equipment that provides an efficient means of removing body fluids (e.g. blood, mucus, vomitus) from wounds, respiratory tract or body cavities.

2. Types

2-1: Electrical

2-2: Manual

-1. Electrical



-2. Manual (Step on)



-2 Manual



3. Parts

3-1. Parts (Manual)

- 1) Frame
- 2) Bellows/Foot pedals
- 3) Collecting bottles with labels
- 4) Stopper
- 5) Ball valve
- 6) Spare tube connector
- 7) Suction tube nipple (inside the bottle)
- 8) Tubing between ball valve/angle piece

- 9) Silicone rubber tubing
- 10) Suction tip with vent hole

3-2. Parts: (Electrical)

- 1) Collecting bottles (2)
- 2) Body and the Handle
- 3) Foot pedal
- 4) On and off switch
- 5) Pilot lamp
- 6) Vacuum adjustment control
- 7) Pressure gauge/Vacuum meter
- 8) Two-way cock/plunger
- 9) Wheels/casters with a lock
- 10) Bacterial filter (traps the microorganisms from going into filter).
- 11) Sensor bottle
- 12) Gasket
- 13) Stopper/ Floater

3-3. Accessories:

- 1) Suction catheter
- 2) Cable and top plug
- 3) Patient connector
- 4) Suction tubing

4. Preparation

- 1) Make sure the machine is clean, complete and in good working condition
- 2) Place the suction machine away from the wall and lock the casters.
- 3) Put some disinfectant in the collecting bottles and record.
- 4) Connect the tubing's appropriately.

5. Operation (electrical)

- 1) Plug into the socket and switch on the mains, stabilizer and machine.
- 2) Ensure the pilot lamp lights.
- 3) Connect the suction tube to the patient connector.
- 4) Fill the collecting bottles not more than $\frac{2}{3}$ as the secretions will over flow to the motor causing damage.
- 5) When one bottle is $\frac{2}{3}$ filled, shift to the other bottle.

6. Care

6-1: Immediate care

- 1) Suck in decontaminant, clean water before disconnecting.
- 2) Switch off the machine, stabilizer and main.
- 3) Unplug the cable from the socket.
- 4) Disconnect tubing, remove bottles and empty the content
- 5) Decontaminate the bottles and tubes, wash with soapy water, rinse with clean water and leave it to dry.

6-2: Routine care

- 1) Make sure that the equipment is clean and dry at all times.
- 2) Pack the tubing in the drum and sterilize.
- 3) Check the tubing for the damages or deterioration
- 4) Remove the foot pedal from the machine when not in use.

Note:

- 1) Electrical suction machine is not recommended for infants because of the high pressure.
- 2) A pressure low suction machine is recommended for babies (manual type)
- 3) The gasket and the floater should be taken care of which are located on the cover of the collecting bottle.
- 4) The bacterial filter should be changed regularly or when it changes color do not open.

7: Manual type

7-1 Preparation: Same as electrical

7-2 Operation:

- 1) Put little water in the bottles (in case of a baby)
- 2) Change the catheter after use and dispose off.

Note:

In case the equipment is to be used for babies: -

- 1) Put little water in the collecting bottle. This is because the disinfectant is harmful to babies in case of back flow.
- 2) The manual type is recommended for children and babies because of less pressure.

3.11 SPHYGMOMANOMETER (BLOOD PRESSURE MACHINES)

1. Definition

Sphygmomanometer is a medical equipment used for measuring patient's/clients blood pressure.

2. Types



Stethed scop picture

3. Parts of Blood Pressure Machine:

- 1) Inflatable cuff
- 2) Velcro/Fastener
- 3) Bladder
- 4) Rubber tubing
- 5) Rubber pumping bulb (mercury and Aneroid)
- 6) Pressure releasing valve (mercury and Aneroid)
- 7) Mercury column lever (mercury type)
- 8) Lock (mercury type)
- 9) Pressure gauge (Aneroid type)
- 10) Body (Mercury and Digital type)
- 11) Case
- 12) Mercury tank/reservoir (mercury type)
- 13) Battery compartment (digital type)
- 14) Control panel (digital type)

4. Preparation

- 1) Ensure the machine is clean and in good working condition
- 2) Ensure the stethoscope is available.
- 3) In case of digital the right batteries should be fixed.

5. Operation

- 1) Explain the procedure to the patient/client using simple terms.
- 2) Put the patient/client in comfortable position preferably lying on the back or sitting up in the chair. and avoid crossing the legs.
- 3) Open the mercury column lever (mercury type only)
- 4) Fit the cuff around the patient's upper arm above the elbow.
- 5) Close the pressure relief valve.
- 6) Feel for the pulse at the brachial artery.
- 7) Pump the bulb until it reaches 200 mm Hg reading (mercury & aneroid only).
- 8) With the stethoscope in position slowly open the pressure relief valve, deflating the cuff at 2-3 mm Hg reading per second. (mercury & aneroid only).
- 9) Take the reading when you hear the first soft thumping of the patient/client pulse. This is the systolic pressure. (mercury & aneroid) and take the second reading when the sound of the pulse begins to fade. This is the diastolic pressure. (mercury & aneroid).
- 10) Open the pressure relief valve to release the air completely. (mercury and aneroid)
- 11) Remove the cuff from the patient's/client's arm
- 12) Record the results i.e.

$$\text{Blood Pressure} = \frac{\text{Systolic Pressure}}{\text{Diastolic Pressure}} \text{ (mmHg)}$$

6. Care

6-1: Immediate Care

- 1) Squeeze the cuff to remove excess air.
- 2) Fold the cuff properly and put in the case/box
- 3) Lock the mercury so that it does not spill or pour (mercury type only)
- 4) Close the case and keep in the safe place.

6-2: Routine Care

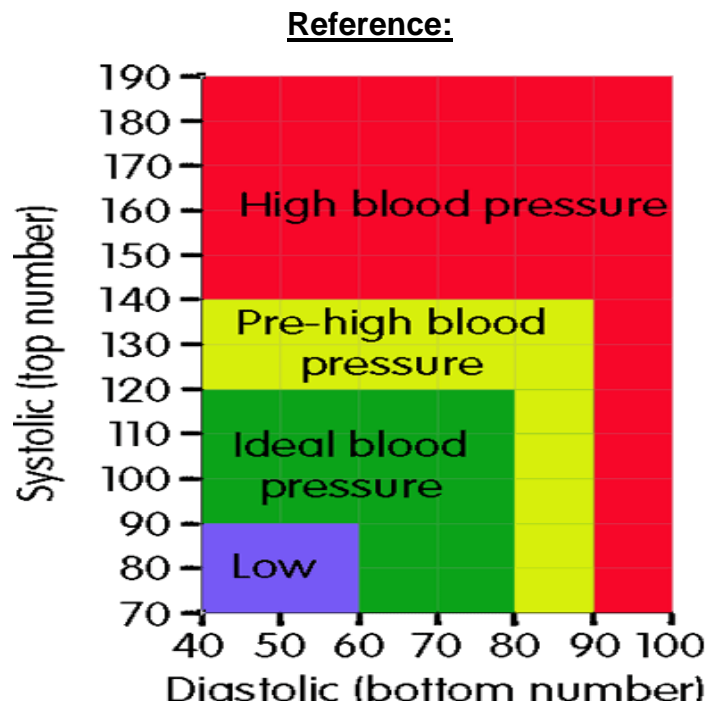
- 1) Dump dust the case with soapy water and leave it dry.
- 2) Make sure the machine is in good working condition by checking regularly:
 - the bulb, cuff and tubing's for cracks or any signs of deterioration and batteries for leakages.
- 3) Ensure that air does not escape from the pressure relief valve if fully locked, (if it does, it means there is a crack on the tubing or the nut is loosely fixed).
- 4) Make sure that there is no leakage of mercury (mercury type)
- 5) Ensure that when the Mercury lever is opened, the mercury level is at zero and

when pumped it does not split (mercury type)

- 6) Wash the inflatable cuff, wipe tubing and bladder with damp cloth when necessary.
- 7) Report any fault immediately so that it can be repaired by the medical technician.
- 8) If not in use store in the cupboard in its labeled place.
- 9) Make sure mercury is bright silver in color.

Note:

- 1) Check for effectiveness of the machine by tying the inflatable cuff on the glass bottle, pump the bulb until the pressure reaches 200mmHg and leave it to stand for 10 seconds, if mercury does not drop within 10 seconds, it means the Blood pressure machine is effective.
- 2) If patient has been doing an activity should first rest for 10 minutes.
- 3) If patient has been eating hot food should first rest for 30 minutes.



3.12 WEIGHING SCALE

1. Definition

Weighing scale is medical equipment used for taking the weights of patients /clients in health facilities.

2.Types

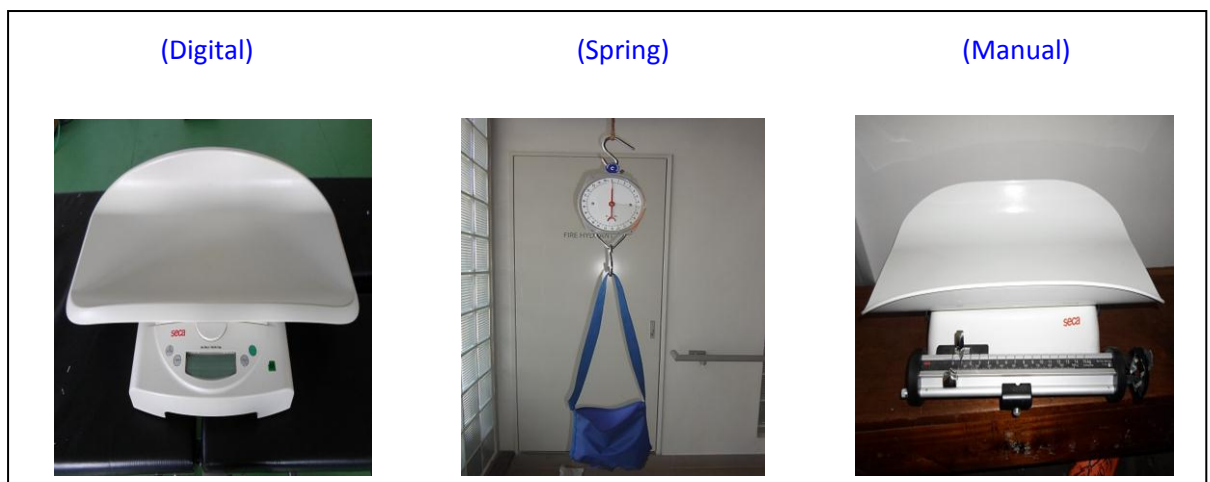
2-1: Infants

2-2: Adults

2-1: Infants:

Sub-types of infant weighing scales:

- 1) Digital
- 2) Spring
- 3) Manual



2-2: Sub-types of Adult weighing scale:



3. Parts:

- 1) Baby tray
- 2) Body
- 3) Scale with indicators
- 4) Weight indicators (manual)
- 5) Locks (some models)
- 6) Control panel (digital)
- 7) Battery compartment (digital)
- 8) Adjusting screw (manual)
- 9) Hook (spring)
- 10) Height measure
- 11) Rubber stands (manual and digital)
- 12) Screen (digital)

4. Accessories

- 1) Weighing bag
- 2) Rope
- 3) Poles
- 4) Batteries

5. Preparation

- 1) Ensure the weighing scale is clean, complete and in good working condition.
- 2) Place the scale on a flat firm surface/ bar.
- 3) Remove excess cloths.

6. Operation

6-1: Operation (Manual)

- 1) Unlock the scale
- 2) Put all the weight indicators to zero
- 3) Balance the scale
- 4) Then take the weight
- 5) Record the readings
- 6) The weighing scale should be at eye level.

6-2: Operation (Digital)

- 1) Switch on the scale
- 2) Wait to balance to zero

7. Care

7-1: Immediate care

- 1) Adjust weight indicators back to zero.
- 2) Wipe with disinfectant, soapy water, rinse with clean water and leave it dry.
- 3) Lock the scale if it has a lock.
- 4) Wash the bag when it is soiled and leave it to dry.

7-2: Routine care

- 1) Ensure the weighing scale is on a flat firm surface, away from the wall.
- 2) Make sure the weighing scale is always clean in a good working condition.
- 3) Avoid unnecessary movement of the scale.
- 4) Replace the dry cells in the digital type when necessary.
- 5) Leave it dry at all times.
- 6) Always balance the scale to zero and lock.
- 7) Interchange the batteries when not in use.

Note:

- 1) Do not place any objects on the weighing scale as it will make it ineffective.
- 2) Remove the baby's bag from the weighing scale when not in use.
- 3) Always adjust the weights/pointer back to zero.
- 4) Remove the scale from the bar when not in use.
- 5) Remove any excess weight like phones, jewelry, watches, bags, artificial bums before taking weight.

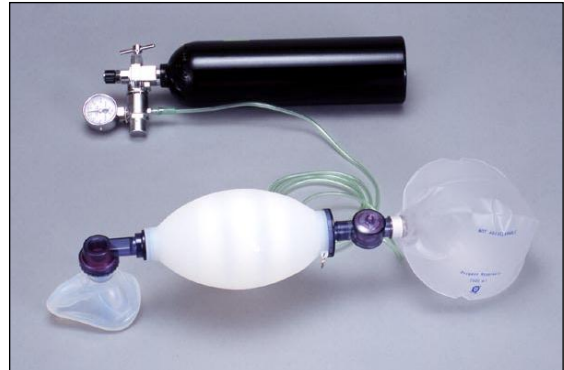
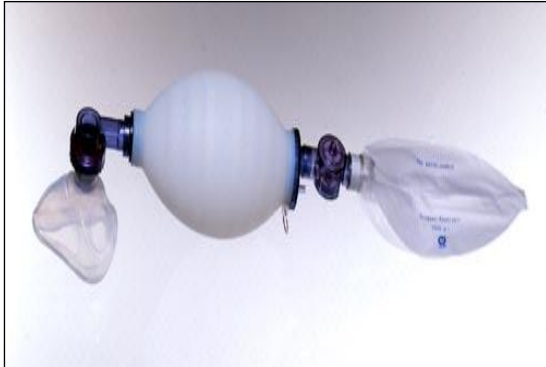
3.13 RESUSCITATOR

1. Definition

A Resuscitator is a medical equipment used for reviving someone who appears to be dead. i.e. it is to bring back a person to consciousness.

2. Types

2-1: Infant



2-2: Adult



3. Parts: (A Set contains)

- 1) Face masks for Adults & infants (different sizes).
- 2) Self-inflating bag with air reservoir (different sizes)
- 3) Oxygen connector
- 4) Diaphragm
- 5) Oxygen inlet
- 6) Oxygen outlet

4. Accessories

- 1) Airway piece
- 2) Tracheal tubes
- 3) Bulb syringe/penguin sucker
- 4) Laryngoscope
- 5) Oxygen cylinder set
- 6) Oxygen tube

5. Preparation

- 1) Ensure the equipment set is clean, complete and in good working condition.
- 2) Assess the condition of the patient to be resuscitated.

6. Operation

- 1) Put the patient in supine position and slightly extend the head between flexion and extension supported with a small cloth/pillow.
- 2) Clear the airway by sucking the mucus/fluid.
- 3) Place the face mask firmly over the mouth and nose
- 4) Pull the lower jaw forward.
- 5) Squeeze the bag between thumb and fore finger about 40 times per minute.
- 6) Look at the chest to see whether it expands.
- 7) Attach oxygen line to connect on the bag and set oxygen flow as required.
(monitor using pulse oximeter)
- 8) Continue artificial respiration until the patient breathes spontaneously.

7. Care

7-1: Immediate care

- 1) Disconnect the resuscitator set.
- 2) Decontaminate the face mask, the airway tube, laryngoscope, airway piece, wash with soapy water, rinse in clean water and leave it to dry. -
- 3) Wipe the inflating bag and oxygen reservoir with Jik 0.5%, soapy water then clean water and allow it to dry.
- 4) Reassemble the resuscitator and put it back in its bag.

7-2: Routine care

- 1) Make sure the set is clean, complete and in good working condition.
- 2) Check for cracks in tubes and ambu bag
- 3) Label empty oxygen cylinder and ensure that they are taken to stores for refilling.

Note:

- 1) Provide warmth during resuscitation
- 2) Do not take too long, be quick.
- 3) Do not aspirate the stomach during resuscitation.
- 4) Avoid suctioning too often.
- 5) If thick meconium or mucous is present, use the laryngoscope to see the back of the throat and possibly the vocal cords where you are sucking.

For Infants:

- 1) Put the baby in the warm resuscitator
- 2) Wrap it in a dry towel
- 3) Suck mouth, throat and nostrils with mucus extractor.
- 4) Do not suck too deep (4-5cm) or too long (15 seconds) as either may cause spasms at the vocal cords or slow the heart rate.
- 5) Do not inject vitamin k before the baby is breathing well (ventilate first then inject later).
- 6) Do not give injection into the umbilical vein unless you have had special training to do so.
- 7) Do not use nikethamide or stimulants.
- 8) Do not bath the baby immediately (it is unnecessary).
- 9) If you hyperextend the baby's head as you would do with an adult the airway becomes obstructed (put baby in sniffing position).

3.14 RECOVERY BED

1. Definition

Recovery Bed is medical furniture used in health facilities for unconscious and restless patients.

2. Types:

2-1: Manual

2-2: Electrical

3. Parts

- 1) Head frame
- 2) Foot end frame
- 3) Back section base
- 4) Hip section base
- 5) Leg section base
- 6) Mattress stopper
- 7) Side Rail stowing holder
- 8) Back raising handle
- 9) Knee raising handle
- 10) Main frame
- 11) Raising/lowering handle
- 12) Handle insertion hole
- 13) Casters with lock



4. Preparation

- 1) Ensure that the bed is on a firm surface
- 2) Ensure that casters are locked
- 3) The bed must be clean and made with clean linen

- 4) The handle for raising and lowering must be at hand
- 5) The side rails must be in good working condition

5. Operation

- 1) Place the patient on the bed.
- 2) Maneuver the bed to an appropriate position according to the patient's condition using the handle.
- 3) Continue monitoring the patient until the condition improves.
- 4) Lower the side rails when removing the patient from the bed.
- 5) Use the bed in the correct position.

6. Care

6-1: Immediate Care

- 1) In case of soiling with blood and other secretions, decontaminate for 10 minutes, clean with soapy water, rinse and leave it dry.
- 2) Adjust the bed to its normal position if necessary and lock it.

6-2: Routine care

- 1) Daily dump dusting of the bed/PRN (when necessary)
- 2) Make the bed with clean linen.
- 3) The casters must be regularly cleaned and locked before, during and after use.

Note:

- 1) Be careful not to trap the patients head, neck, legs and arms in the gaps between the side rails and end boards.
- 2) Make sure that patient does not fall off the bed even when using side rails.
- 3) Do not use the bed for infants or toddlers.
- 4) Lock the casters except when moving the bed.
- 5) Do not repair or modify the bed yourself.
- 6) Use the bed properly and in accordance with the patient's condition.
- 7) Do not sit on the side rail, head board or foot board
- 8) Do not use the bed for more than one person
- 9) Monitor the proper use of the bed

3.15 PULSE OXIMETER

1. Definition

Pulse Oximeter is a medical equipment used for monitoring the patient's/client's pulse and oxygen concentration in the blood saturation. Its procedure for measuring the concentration of oxygen in the blood is referred to as oximetry and it is done using an oximeter, a photoelectric device specially designed for this purpose.

2. Types

All desktops and sports pulse oximeter are electrical; all use A/C or D/C current.

2-1: Desktop

2-2: Sports pulse Oximeter



3. Parts of Pulse Oximeter

- 1) Body
- 2) Control panel
- 3) Control knob
- 4) On/off switch
- 5) Battery compartment
- 6) Screen

4. Accessories

- 1) Finger probe (adult and children)
- 2) Skin sensor
- 3) Finger probe cable
- 4) Cable and Top plug (Desk top type only)
- 5) Connector

- 6) Charger
- 7) Batteries

5. Preparation

- 1) Ensure that the Pulse Oximeter is on a firm leveled surface
- 2) Make sure the equipment is clean and in good working condition.
- 3) There should be a stabilizer if possible.

6. Operation

- 1) Plug the electric cable in the socket.
- 2) Switch on the mains, stabilizer and machine.
- 3) Put the finger probe on the patient's finger (index)
- 4) Read the pulse and the amount of oxygen in the blood.
- 5) Record the readings. (Normal pulse 60 to 90 bpm, Normal oxygen concentration 96 to 99(100) %)

7. Care

7-1: Immediate Care

- 1) Disconnect the finger probe from the patient/client.
- 2) Switch off from the machine, stabilizer then socket.
- 3) Un-plug the cable from the socket.
- 4) Fold the cable properly.
- 5) Place the probe with equipment in its proper place.

7-2: Routine Care

- 1) Make sure the equipment is in good working condition.
- 2) Dump dust when the equipment is dusty/PRN.
- 3) Keep the equipment dry at all times.
- 4) Check the cable and the finger probe for any damage.

Note:

- 1) Some people compensate for low oxygen concentration e.g. Sports people, regular swimmers, mountain climbers, Sickler and heavy smokers.
- 2) Artificial, long, and painted nails interfere with the readings.
Always keep it charged.

3.16 MANUAL VACUUM ASPIRATOR (MVA)

1. Definition:

It is medical equipment used to aspirate retained products of conception below 12 weeks of gestation.

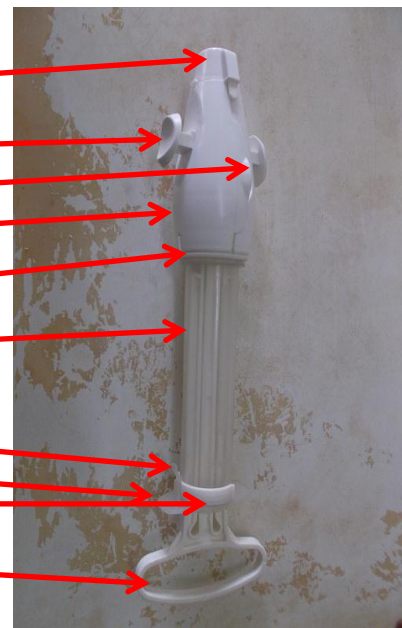
2. Types

2-1: Single Valve (IPAS MVA)

2-2: Double Valves (IPAS MVA PLUS)

3. Parts

- 1) Cup
- 2) Valve buttons
- 3) Valve layer
- 4) Valve
- 5) Plunger & O ring
- 6) Cylinder
- 7) Clip
- 8) Cylinder base
- 9) Collar stopper
- 10) Plunger handle



Parts



SELECTED CANNULA/SIZES AND COLOUR CORDING

APPROXIMATE UTERINE SIZE	APPROXIMATE CANNULA
LMP	
5-6WKS	6MM
7-9WKS	6-8MM
9-12WKS	7-12MM

Cannula size	Colour of adaptor
6mm	Blue
7mm	Tan
8mm	Ivory
9mm	Dark brown
10mm	Dark green
12mm	No adapter

INDICATIONS

1. Treatment of incomplete abortion
2. Missed abortion
3. Therapeutic termination of gestation at 12weeks

CONTRA INDICATIONS

1. Incomplete abortion of gestational period above 12weeks
2. Incomplete abortion with uterine fibroids
3. Acute pelvic infection before treatment.
4. Bleeding disorders.

4. Accessories:

- 1) Cusco's vaginal speculum
- 2) Sponge holding forceps
- 3) Tenaculum
- 4) Silicon oil
- 5) Sterile gloves
- 6) Sterile gauze
- 7) Gallipots
- 8) Lignocaine
- 9) Syringes and needles
- 10) Cannula in different sizes
- 11) Dilators in different sizes

5. Preparation

- 1) Ensure that the patient consents for the procedure.
- 2) Ensure the equipment is complete and in good working condition.
- 3) Assemble the equipment and make it ready for the procedure.
- 4) Prepare the patient and make her comfortable before the procedure.
- 5) Position the patient in lithotomy
- 6) Swab the vulvar
- 7) Always ensure there are two trained health workers for the procedure

6. Operation

- 1) Observe a septic technique
- 2) Insert Cusco vaginal speculum
- 3) Stabilize the cervix using tenaculum
- 4) Clean the cervix
- 5) Inject lignocaine in the cervix [cervical block]
- 6) Insert the cannula into cervical Os.
- 7) Connect the syringe to the cannula
- 8) Aspirate the content of conception until signs of completion are seen: -
 - Bright red blood
 - Gritty sensation
 - Cannula gripped by the cervix
 - Leave the mother comfortable

7. Care

7-1: Immediate care:

- 1) Empty the contents in a bowl, then detach the syringe.
- 2) Re-attach the cannula to the syringe
- 3) Rinse the syringe and cannula by drawing the decontaminant three times
- 4) Disassemble and decontaminate in 0.5% Jik for 10 min, wash in soapy, then rinse in clean water, leave to dry, then pack for autoclaving.
- 5) Sterilize at 121°C

7-2: Routine care:

- 1) Ensure it is in a good working condition.
- 2) Check for any cracks on the cylinder
- 3) The set should always be complete and sterile
- 4) Replace the worn-out parts regularly
- 5) Oil the O ring when plunger is stuck
- 6) The set should be kept in a safe place
- 7) Enter in Inventory book
- 8) Make sure the set is engraved with name of the hospital and unity
- 9) Hand over to the next health worker

Note:

- 1) Do not autoclave at a temperature higher than 121° C.
- 2) Do not leave the equipment in JIK for more than 10 minutes.
- 3) Do not take long time with the patient while using MVA, take 5-10 minutes.
- 4) Allow the patient to rest in the recovery area for about 30-60 minutes.

Precaution:

- 1) Bleeding, nausea, sweating and dizziness are common side effects of MVA, therefore, care be taken to monitor her.
- 2) Never operate MVA when the patient has full bladder mo.

3.17 INFANT WARMER

1. Definition

Infant warmer is a medical equipment used for keeping the babies warm and maintaining the body temperature.

2. Types

2-1: Fixed

2-2: Mobile (Heater and Integral Models)

-1 Heater Model



-2 Integral Models:



3. Parts

- 1) On/off switch
- 2) Power indicator lamp
- 3) Heater Module
- 4) Halogen Bulb
- 5) Heater Output Control
- 6) Skin sensor
- 7) Pillars/Bars
- 8) Retaining screw for fixing the pillar
- 9) Slide base bracket/slide panels
- 10)Conductive mattress
- 11)Knobs for tilting the table
- 12)Treatment table
- 13)Bassinet (slide pad)
- 14)Shelf
- 15)Drawer with a resuscitation set
- 16)Pedestal/Casters

4. Accessories

- 1) Cable with top plug
- 2) High board

5. Preparation

- 1) Ensure that Infant warmer is clean before use.
- 2) Arrange the conductive mattress ready to receive the Baby.
- 3) Lock the pedals so that it does not move.
- 4) Make sure all bolts, Nuts and Screws are tightened.
- 5) First take the Baby's rectal temperature and record.
- 6) Switch on 30mins – 1hour before receiving the baby.

6. Operation

- 1) Plug the power cable into the socket.
- 2) Switch on from mains, stabilizer and equipment.
- 3) Select the temperature as required on the control panel and leave it to warm for 30mins.
- 4) Leave the warmer to warm for 30mins.
- 5) Place the Baby on the Bassinet.
- 6) Put the skin sensor on Baby's skin to monitor the progress on Baby's temperature.

- 7) Remove the baby, when the body temperature is maintained.

7. Care

7-1: Immediate care

- 1) Switch off the infant warmer, stabilizer and mains.
- 2) Unplug from the socket.
- 3) Decontaminate the mattress, if stained with blood.
- 4) Wipe with soapy water and rinse with clean water
- 5) Leave it dry.

7-2: Routine care

- 1) Ensure the infant warmer is clean before use.
- 2) Check that it is in good working condition.
- 3) Fold the cable properly.
- 4) Replace all the Halogen Bulbs even if it is only one which has blown.
- 5) Report immediately any fault to immediate supervisor.

8. Simple Maintenance

- 1) Lubricate the casters when necessary with grease.
- 2) Ensure that the bulbs are all functional

Note

- 1) The lifetime for halogen bulbs is 2,000 hours.
- 2) Replace all the Halogen Bulbs even if it is only one that has been blown off.
- 3) Ensure that you have spare parts in stock e.g. Fuse, bulbs.
- 4) Clean every part of the warmer before use.
- 5) Turn off the main switch when not in use.

3.18 INFANT INCUBATOR

1. Definition

Infant Incubator is a medical equipment used for keeping a baby at constant temperature, humidity and oxygen concentration.

2. Types

2-1: Fixed



3. Parts

- 1) Main body
- 2) Control panel
- 3) Hand inlet with sleeves
- 4) Access door with lock
- 5) Baby board/tray with a mattress.
- 6) Thermostat
- 7) On/Off Switch.
- 8) Humidifier tray
- 9) Fresh air inlet/outlet.
- 10) Thermometer
- 11) Bulbs/lamps
- 12) Oxygen inlet.
- 13) Skin sensor
- 14) Drawers
- 15) Casters with lock
- 16) Drip stands
- 17) Bacterial filter

- 18) Humidity gauge
- 19) Humidity measure/manual hygrometer
- 20) Cable with top plug.

4. Preparation

- 1) Make sure it is clean, complete and in good working condition.
- 2) Check that the fresh air inlet is not obstructed to avoid suffocation.
- 3) Fill to maximum level the humidifier tray with distilled/rain water.
- 4) Cover the mattress with sterile towels
- 5) Clean your hands well before entering the incubator.
- 6) Switch on the incubator for 30minutes to one hour before receiving the baby.
- 7) Take the baby's weight and rectal temperature.

5. Operation

- 1) Set the required temperature, humidity and oxygen concentration if needed.
- 2) Place the baby in the incubator and cover with a thin cotton cloth or leave the baby uncovered.
- 3) Monitor baby's temperature, humidity and oxygen concentration. Monitor oxygen by using pulse oximeter.
- 4) Keep recording the readings.
- 5) Feeding, taking weight, administering treatment, changing positions and napkins should be done within the incubator.

6. Care

6-1: Immediate Care

- 1) Remove the baby from the incubator
- 2) Switch off the equipment, stabilizer, mains and unplug.
- 3) Gently fold the cables.
- 4) Wash the towels, dry and sterilize.
- 5) Remove the mattress, clean with soapy water or decontaminate if need be and leave it to dry.
- 6) Clean the incubator with soapy water, clean water and leave it to dry.

6-2: Routine care

- 1) Daily damp dusting of the incubator – PRN and leave to dry.
- 2) Replace hand inlet sleeves regularly and wash them with soapy water, rinse and leave it to dry.
- 3) Cover the incubator with a clean piece of cotton cloth when not in use.

Note:

- 1) The nursing procedures will be done when the baby is in the incubator even while taking weight. (The weight can be taken from the incubator if there is provision for taking weight).
- 2) Do not use alcohol or Jik for cleaning.
- 3) Do not let water enter into the thermostat.
- 4) Infection prevention measures are strictly observed in the nursery room.
- 5) Ensure that the bulbs are in good working order
- 6) Ensure that the humidifier tray is filled with enough distilled water.
- 7) The incubator should be away from direct sun rays and dust free environment

3.19 HOT AIR OVEN

1. Definition

Hot Air Oven is a medical equipment which uses heated air for sterilization.

2. Purpose

- 1) It is used in the Laboratory for sterilization of glass slides, test tubes, instruments and specimen bottles.
- 2) It is used for drying specimen e.g. Blood Slide



3. Parts

- 1) The Body
- 2) Door (double walled door) with gasket
- 3) Ventilators
- 4) Thermostat
- 5) Temperature Regulator
- 6) Temperature Gauges/Thermometer
- 7) Pilot Lamp/Indicating light
- 8) On and Off Switch
- 9) Slotted equipment tray
- 10) Shelves
- 11) Sterilization chamber

4. Accessories

- 1) Cable with top-plug
- 2) Stabilizer

5. Preparation

- 1) Make sure the Hot Air Oven is clean inside and outside.
- 2) Check that it is in good working condition.
- 3) Make sure it is on a firm surface.
- 4) Load/pack the items to be sterilized

6. Operation

- 1) Load dry items in the Oven
- 2) Close the Oven door properly
- 3) Open the ventilators
- 4) Plug in the socket and switch on power and wait.
- 5) Set the temperature regulator to the required temperature e.g. 160⁰ C for 15 minutes (glass slides).
- 6) After the required temperature and time is over, it will switch off automatically.
- 7) Remove the items with sterile cheatle forceps when cool.

7. Sterilization temperature

- 1) Temperature range: 40°C-200°C
- 2) Glass slides 150⁰C-160⁰C – 15 minutes
- 3) Culture 160°C – 1 hour; 170° C – 45 minutes; 180° C – 30 minutes

8. Care

8-1: Immediate care

- 1) Switch off equipment, stabilizer, then main and unplug it from the socket.
- 2) Allow the equipment to cool for 20 minutes.
- 3) Remove the items from the oven.

8-2: Routine care

- 1) Make sure that the Hot Air Oven is clean inside and outside and in good working condition.
- 2) It must be clean inside and outside.
- 3) While cleaning use soft cloth, soap and water only.
- 4) Check for any visible damage especially on the door gasket.
- 5) Switch the mains off when not in use.
- 6) Cover the equipment with clean cloth when not in use.
- 7) Report faults to the immediate supervisor

Note

- 1) Never use steel wire to clean the oven, it will spoil the surface.
- 2) Do not place rusty or wet instruments in the oven because it will spoil the surface.
- 3) In case the oven is to be moved from one place to another, at least two or more persons are required to transport the equipment.
- 4) Use the right temperature for different items for sterilization process.
- 5) Do not place plastic or linen in the Hot air oven (these will be burnt).

- 6) The equipment is purposely for un-wrapped equipment only.
- 7) In case there is no proper places for storage close the vents and leave the items in the oven.
- 8) Lubricate the door with silicon oil/WD40 lubricant (only outer part) do not use inside.
- 9) Never close the vent during sterilization process.

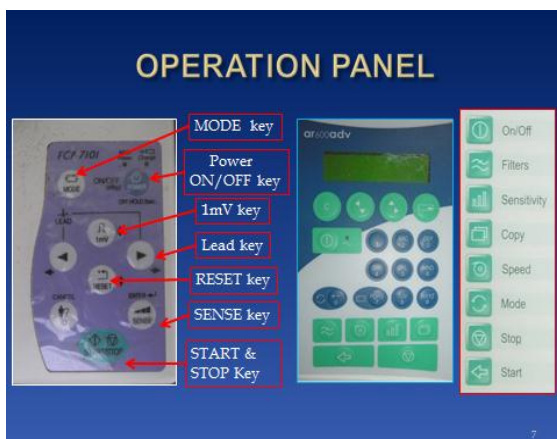
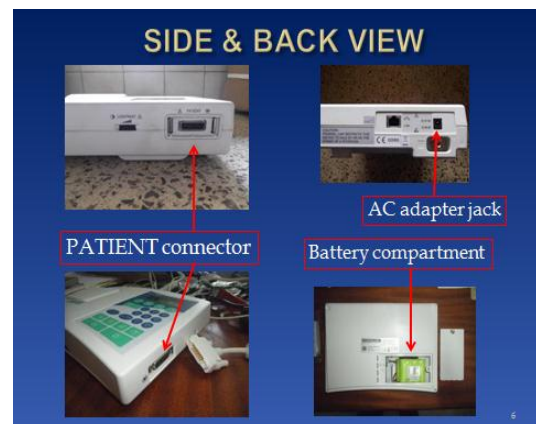
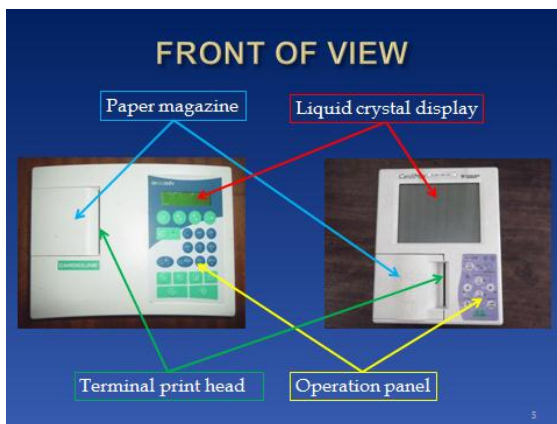
3.20 ELECTROCARDIOGRAM (ECG)

1. Definition

Electrocardiogram (ECG) is a diagnostic tool that is routinely used to assess the electrical and muscular functions of the heart. It aims at detecting abnormalities of the heart.

2. Parts

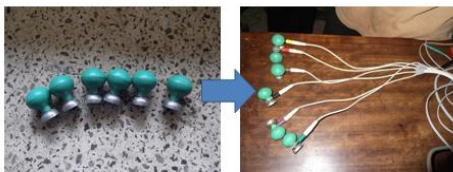
- 1) Body
- 2) Control panel
- 3) Screen/Monitor
- 4) Printer
- 5) Patient connector
- 6) Battery pack compartment



3. Accessories

- 1) Cable with Top plug
- 2) Power supply cord
- 3) Patient cable
- 4) Limb electrodes
- 5) Chest electrodes
- 6) Keratin cream (Paste)
- 7) Printing paper

Chest Electrode



Connect the Chest Electrode and Patient cable

11

Power supply cable



Patient cable



9

Limb Electrode



Connect the Limb Electrodes and Patient cables

10

Keratin cream (Paste)



12

COLORS TO NOTE
(AHA- American Heart Association)

Limbs Electrode 4 pieces in different colors different limbs for application.

RA	Right Arm	White
LA	Left Arm	Black
RL	Right Leg	Green
LL	Left Leg	Red

13

COLORS TO NOTE
(IEC- International Electrotechnical Commission)

There is another type of color coding.

R	Right Arm	Red
L	Left Arm	Yellow
F	Left Leg	Green
N	Right Leg	Black

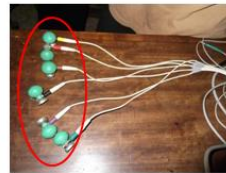
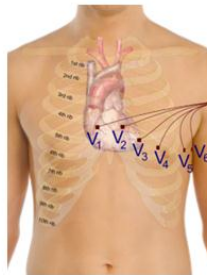
14

- Clamp the arms and legs (several centimeters above the wrist and ankle) firmly with the electrode clips.
- Attaching the limb electrodes (4 locations)



13

Chest Electrode



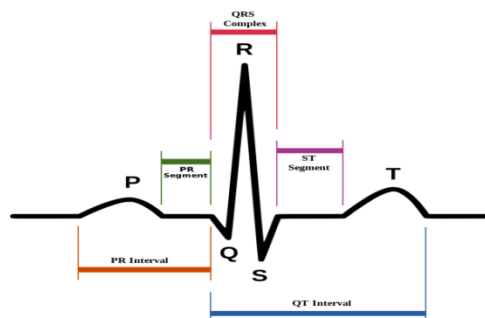
16

Chest Electrode (IEC- International Electrotechnical Commission)		
□ They are 6 in different colors in 6 places		
V1	The fourth intercostal space on the right sternal border	Red
V2	The fourth intercostal space on the left sternal border	Yellow
V3	Midway between locations V2 and V4	Green
V4	The fifth intercostal space on the left mid- clavicular line	Brown
V5	On the left anterior axillary line on the same horizontal level as V4	Black
V6	On the left mid- axillary line on the same horizontal level as V4 and V5	Purple

17

Chest Electrode (AHA- American Heart Association)		
□ There is also a different color coding.		
V1	The fourth intercostal space on the right sternal border	Red
V2	The fourth intercostal space on the left sternal border	Yellow
V3	Midway between locations V2 and V4	Green
V4	The fifth intercostal space on the left mid- clavicular line	Blue
V5	On the left anterior axillary line on the same horizontal level as V4	Orange
V6	On the left mid- axillary line on the same horizontal level as V4 and V5	Purple

18



The ECG Waveform

4. Preparation

- 1) Make sure the machine is complete and in good working condition.
- 2) Switch on power. Make sure the initial screen is displayed.
- 3) Adjust the display contrast.
- 4) Set the Date and Clock.
- 5) Check whether the recording paper is loaded properly.
- 6) Enter Patient's Data: -
 - ID (patient identification number)
 - Name
 - Sex (Male or Female)
 - Age
 - Ward/Unit
 - Physician
- 7) Load the ECG recording paper to the machine.
- 8) Explain the procedure to the patient.
- 9) Connect the accessories

5. Operation

- 1) Apply the keratin cream to the patient's skin aiming at the areas of intercostal spaces, e.g. V1 ~ V6
- 2) Attach the electrode to the keratin cream in right position.
- 3) Switch on power after all connections are done.
- 4) If the electrodes are wrongly applied, it will indicate on the monitor.

6. Care

6-1: Immediate Care

- 1) Switch off power
- 2) Remove the Limb and Chest Electrodes from patient.
- 3) Clean up the patient and leave her/him comfortable
- 4) Unplug the top plug from the power source.

6-2: Routine care

- 1) Dump dust when necessary.
- 2) Cover the machine to prevent dust with clean cloth.
- 3) Use a stabilizer to control current.

3.21 FETAL DOPPLER

1. Definition

Fetal Doppler is a medical equipment used to monitor the fetal heartbeat as early as 8-12 week in a pregnant woman.

2. Types

Pocket Fetal Doppler



100B Fetal Doppler



3. Parts

- 1) Body
- 2) Probe with cable
- 3) On & off switch
- 4) Screen/display
- 5) In-built speakers
- 6) Battery compartment

4. Accessories

- 1) Batteries
- 2) Gel
- 3) Tissues for cleaning the sight

5. Preparation

- 1) Ensure the equipment is clean, complete and in good working condition.
- 2) Prepare the mother for examination and make her comfortable.
- 3) Bring the equipment to the bed side.

6. Operation

- 1) Carry out examination by palpating the mother's abdomen.
- 2) Apply gel on the side where the fetal back is in case of advanced pregnancy

- 3) Carry out examination using a probe
- 4) Record the findings

7. Care:

7-1: Immediate Care

- 1) Switch off the equipment
- 2) Wipe the probe to remove the gel.
- 3) Clean the mother where gel was applied
- 4) Fold the cable gently.
- 5) Put the equipment back into its container
- 6) Return it to its designated area/zone area

7-2: Routine Care

- 1) Make sure the equipment is engraved with the Hospital and Unit name.
- 2) Handover the equipment to the next health worker on duty.
- 3) Servicing of the equipment every six months by trained Biomedical personnel.
- 4) Must be entered into the hospital asset book.
- 5) Must be entered into the inventory book.
- 6) Make sure it is complete.
- 7) Remove/interchange batteries if not in use.
- 8) Report any fault to the immediate supervisor
- 9) Check for any cracks on the rubber contact surface of the probe.

3.22 AUTOCLAVES

1. Definition

An Autoclave is a medical equipment used to sterilize instrument and sundries using steam under pressure and it is loaded from above and usually electrical.

2. Types:

- 2.1 Electrical
- 2.2 Non-electrical

Models: Vertical and Horizontal

1. Electrical



3. Parts of equipment

3.1: Body with outer parts

- 1) Lid with handles
- 2) Control panel
- 3) Wing nuts
- 4) Pressure gauge
- 5) Funnel/glass tube
- 6) Water outlet
- 7) Valves

3.2: Inside part of the autoclave

- 1) Gasket
- 2) Chamber/Inner and outer chamber
- 3) Heater element
- 4) Sensor

- 5) Water level mark

4. Accessories

- 1) Drainage tube
- 2) Electric cable with top plug
- 3) Timer
- 4) Stabilizer
- 5) Sterilizing tapes

5. Preparation

- 1) Ensure the autoclave is clean in and out and in good working condition.
- 2) Check water level.
- 3) Prepare items for autoclaving and put sterilizing tape.
- 4) Ensure availability of the accessories.
- 5) Ensure availability of power source with the right voltage.

6. Operation

- 1) Open the lid and load the items.
- 2) Set functions where they are not preset.
- 3) Cover the lid and tighten the wing nuts diagonally
- 4) Switch on the auto clave and allow cold air to escape.
- 5) Time when temperature and pressure is at constant. This is the period of sterilization.
- 6) After sterilization switch off the autoclave, stabilizer and mains.

7. Care

7-1: Immediate Care

- 1) Release steam.
- 2) Wait for the pressure gauge to reduce to "0" (zero).
- 3) Open the autoclave.
- 4) Drain out water from the autoclave
- 5) Remove the sterilized items from the chamber.

7-2: Routine Care

- 1) Ensure equipment is entered in the hospital asset book.
- 2) Ensure the autoclave is engraved.
- 3) Report any fault to the immediate supervisor

- 4) Handover to the next health worker on duty.

Note:

- 1) Never leave an autoclave unattended to.
- 2) Do not use steel wool for cleaning.
- 3) When power goes off switch off and re-start when power comes back.
- 4) If tap water is used drain it out daily but if soft water drain it out weekly or depending on how busy the unit is.

3.23 DIATHERMY

1. Definition

A Diathermy is a medical equipment used in operating theater to cut and coagulate blood vessels.



Accessories



2. Parts

- 1) Body
- 2) Control panel
- 3) On/off switch
- 4) Monopolar switch
- 5) Bipolar switch
- 6) Foot switch

2-1: Accessories

- 1) Cable from stabilizer to diathermy
- 2) Diathermy pencil and cable
- 3) Diathermy knife
- 4) Patient plate (Return plate)
- 5) Cable with top plug
- 6) Foot pedal switch
- 7) Stabilizer
- 8) Carrier with the casters

3. Preparation

- 1) Make sure the machine is clean complete and in good working condition.
- 2) There should be proper earthing to avoid electric shock.

- 3) Connect the cable and top plug to the main power supply.
- 4) Connect the cable from stabilizer to diathermy machine.
- 5) Connect the diathermy cable to the machine either monopolar or bipolar.
- 6) Connect the diathermy knife to Diathermy cable.
- 7) Connect the insulating plate to the machine.

4. Operation

- 1) Switch on power from the main power supply.
- 2) Switch on the stabilizer.
- 3) Switch on the power on the machine.
- 4) The machine is now ready for use.
- 5) Operate according to Doctor's instructions.

5. Care

5-1: Immediate care

- 1) Switch off the power from the machine, stabilizer and then to the mains and unplug the cable.
- 2) Disconnect diathermy knife and disinfect in Jik 0.5% for 10 minutes and take for autoclaving.
- 3) Disconnect insulating plate and clean with a damp cloth in Jik 0.5% then with soapy water and lastly with clean water and leave to dry.
- 4) Fold the tubing and wires properly ready for next use.

5-2: Routine care

- 1) Make sure the machine is in a good working condition.
- 2) Ensure the machine is clean by damp dusting when necessary.
- 3) Switch off when not in use and leave it covered.
- 4) Keep it in the zoned area.
- 5) Check for breakages, cracks and report any fault to the immediate supervisor.
- 6) Hand over to the next health worker on duty verbally and written.
- 7) It should be entered in the Asset and Inventory books.
- 8) Ensure it is engraved
- 9) It should be serviced after every six months by qualified Technician.

Note:

- 1) Nurses prepare the equipment, but the surgeon does the operation.
- 2) Ensure the equipment is earthed and never forget to put the plate.

3.24 BLOOD GLUCOMETER

1. Definition

A Blood glucometer is a medical equipment used to measure and monitor the blood sugar level of patients/clients.

2. Types (Model)

2-1: Sure Step

2-2: Optimal

2-3: One touch step



Sure Step



Optimal



One touch step

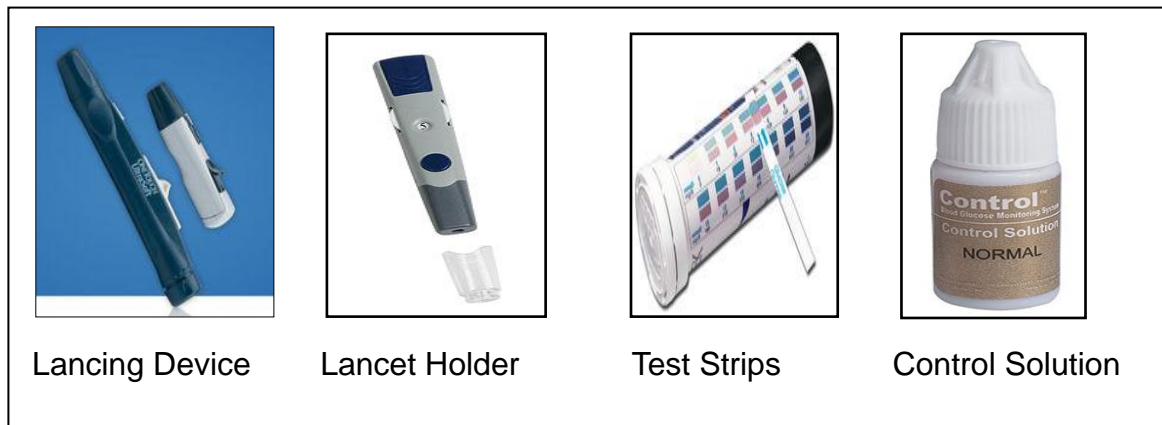
3. Parts

- 1) Body
- 2) Screen
- 3) On/Off switch
- 4) Adjusting button
- 5) Provision for the test strips
- 6) Battery compartment

4. Accessories

- 1) Lancet
- 2) Lancet holder
- 3) Test strips
- 4) Control solution
- 5) Galipot with swabs
- 6) Kidney dish
- 7) Hibitane solution
- 8) Glucometer bag
- 9) Safety box

10) Sterile gloves



5. Preparation

- 1) Ensure that glucometer is clean and in good working condition.
- 2) Check that the batteries are still working well.
- 3) Make sure the test strips are enough, the lancet and lancet holder are in good working condition.
- 4) Make sure the code on the strip container matches with the machine code.

6. Operation

- 1) Switch on
- 2) Put on sterile gloves.
- 3) Insert a new sterile lancet into the lancing device firmly until it is in place and remove the protective cap from the lancet's end.
- 4) Identify the finger and use the sterile swabs to wipe off dirt.
- 5) Remove protective cap from the lancet.
- 6) Hold the lancing device firmly against client's finger and press the release button ejecting the lancet device to puncture.
- 7) Squeeze the side of the fingertip gently to squeeze a drop of blood to the surface about 0.3 to 1 ul this depends on the model.
- 8) Gently put the test strip into the machine port then wait for the meter to display the reading (depends on type),
- 9) The time it takes to read the test strip may range from 3 to 60 seconds.
- 10) Read your blood glucose testing results as it is shown in the monitor.

7. Results

- 1) The results may be interpreted according to the set of the machine.
Example – In mmol or mgdl

To change mgdl to mmol you divide by 18 while to change mmol to mgdl you multiply by 18.

8. Care

8-1: Immediate care

- 1) Switch off the glucometer.
- 2) Remove the used strip from the glucometer and discard in a safety box.
- 3) Clean the test strip port with damp cloth and leave it dry.
- 4) Place the glucometer back in its bag and put in designated place.
- 5) Leave the patient comfortable.

8-2: Routine care

- 1) Check for leakage of the batteries; if not in use remove the batteries from glucometer.
- 2) Clean the machine with damp cloth and keep it in its bag.
- 3) Check the functioning of the glucometer regularly and report any fault to immediate supervisor.
- 4) Daily handing over to the next Health worker on duty.
- 5) Servicing by a Technician after every six months.
- 6) Ensure the glucometer is entered in the Asserts book.
- 7) It must also be in the inventory book.

3.25 PATIENT MONITOR

1. Definition:

Is a medical equipment used to monitor vital signs of patients/clients in health facility. Such parameters include; respiratory rate, ECG, SPO2, blood pressure, temperature etc. It helps to monitor the physiological parameters of an individual which enables health workers to effectively manage the patient.

2. Models

Front view:



Power ON/ OFF switch

Liquid Display

Operational panel



Silence Alarm

NIBP interval button

NIBP Start/Stop

MENU

HOME

Side View

RIGHT



Power Cable

LEFT



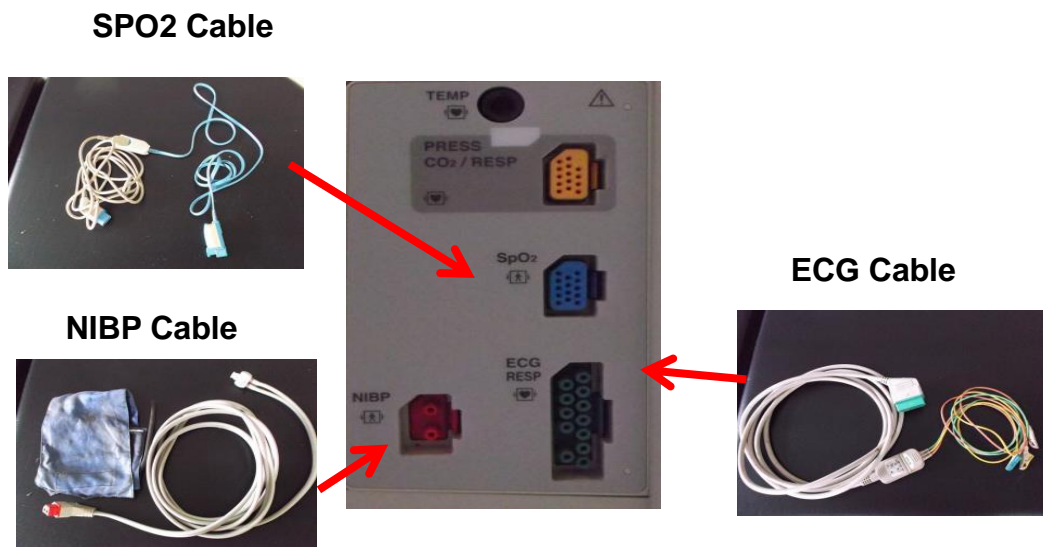
Connection of Blood Pressure, ECG and Pulse Oximeter

3. Parts:

- 1) Body
- 2) Stand
- 3) Control panel which shows the oxygen concentration, blood pressure, respiration rate and pulse rate, pulse heart waves.
- 4) Cuff – B/P (non-invasive)
- 5) Temperature sensor
- 6) SPO2 probe
- 7) Electrocardiograph electrodes
- 8) Skin sensor
- 9) Screen
- 10) Pots for cable, B/P machine, Temp sensor, SPO2 probe, power,
- 11) Handle
- 12) Battery compartment

4. Accessories

- 1) Cable from the blood pressure machine.
- 2) Cable from the ECG
- 3) Cable from the pulse oximeter
- 4) Buttons main, freeze, silent record.
- 5) Cable with temp sensor
- 6) Power Cable & top plug



5. Preparation

- 1) Ensure that the equipment is clean and complete and in good working condition before use.
- 2) Connect different cables to their ports.
- 3) Make the patient comfortable
- 4) The ECG is connected to the patient
- 5) Pulse oximeter is connected to the patient's finger.
- 6) Connect the blood pressure to the patients' arm.
- 7) Connect the temperature sensor to the patients' skin/arm pit.
- 8) Now you are ready for the operation.
- 9) Switch on the switch from the main, stabilizer.

6. Operation

- 1) Plug into the stabilizer then machine and switch on the monitor.
- 2) Enter patient's particulars.
- 3) Apply (Place) the different electrode cables on to the patient.
- 4) Observe and record the readings and monitor the vital signs.

7. Care

7-1: Immediate care

- 1) Switch off power from the monitor, the stabilizer and the mains and unplug.
- 2) Remove all electrodes from patient and fold them well.
- 3) Leave the patient comfortable

7-2: Routine care

- 1) Always keep the machine in good working condition
- 2) Dump dusting after every use.
- 3) Always switch off the machine when not in use
- 4) Keep in a zoned place.
- 5) Handover the machine to the next health worker on duty.
- 6) Ensure the machine is entered into the inventory and Hospital Asset book
- 7) Ensure the machine is engraved

3.26 DEFIBRILLATOR

1. Definition

A Defibrillator is a medical equipment used to counteract a malfunctional/abnormal function of the heart muscle. Defibrillation is the procedure used to treat life threatening conditions that affect the rhythm of the heart such as cardiac arrhythmia, ventricular fibrillation and pulseless ventricular tachycardia. It involves the delivery of an electric shock to the heart which causes depolarization of the heart muscles and re-establishes normal conduction of the heart's electrical impulse.

2. Models



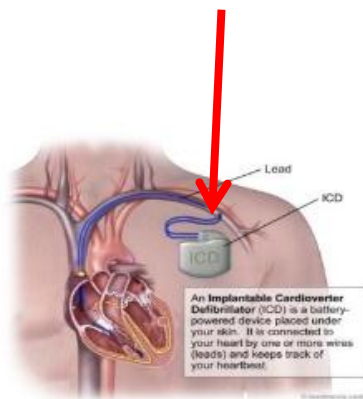
Defibrillator

(Manual External Defibrillator)

- It is used by Medical Staff in a hospital

ICD

(Implantable Cardioverter Defibrillator)



AED

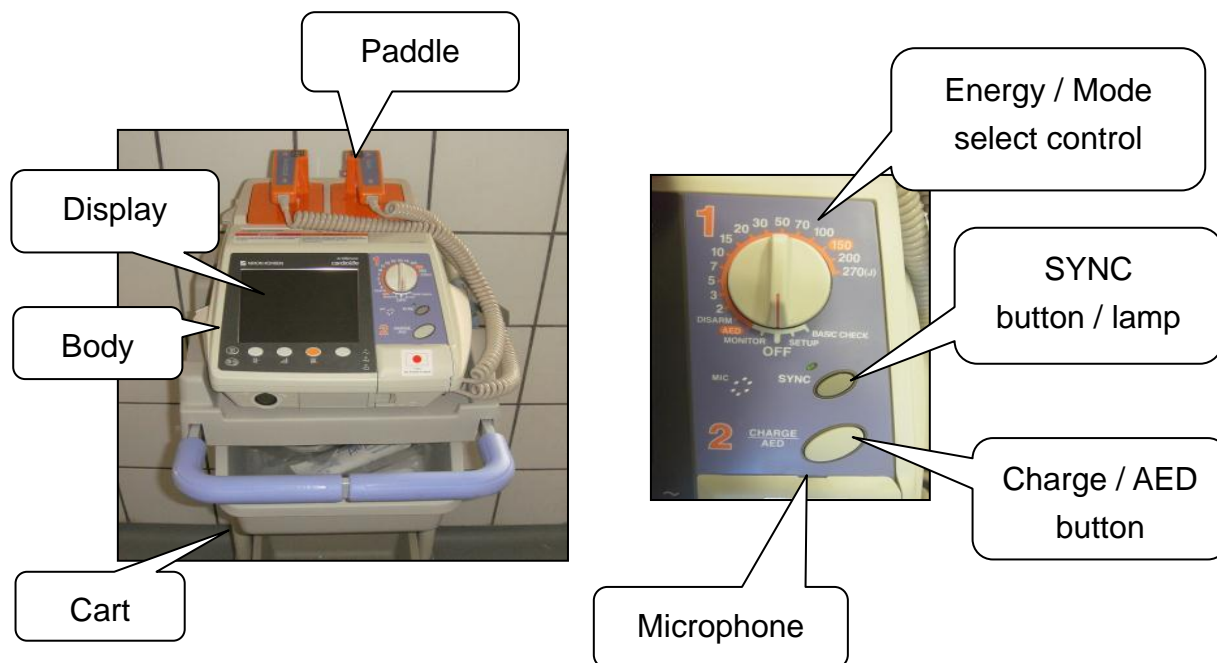
(Automated External Defibrillator)



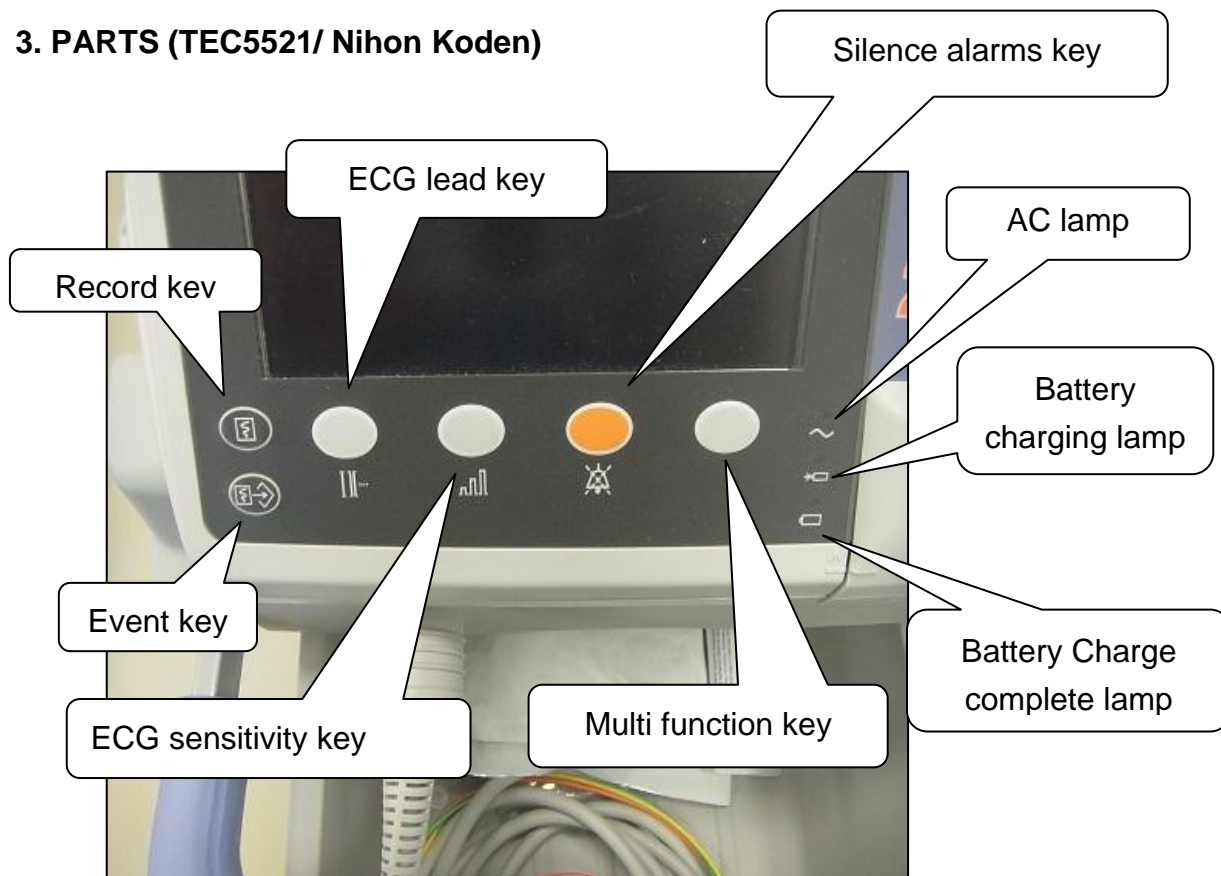
3. Parts

1. Main Body
2. An electrode or cab

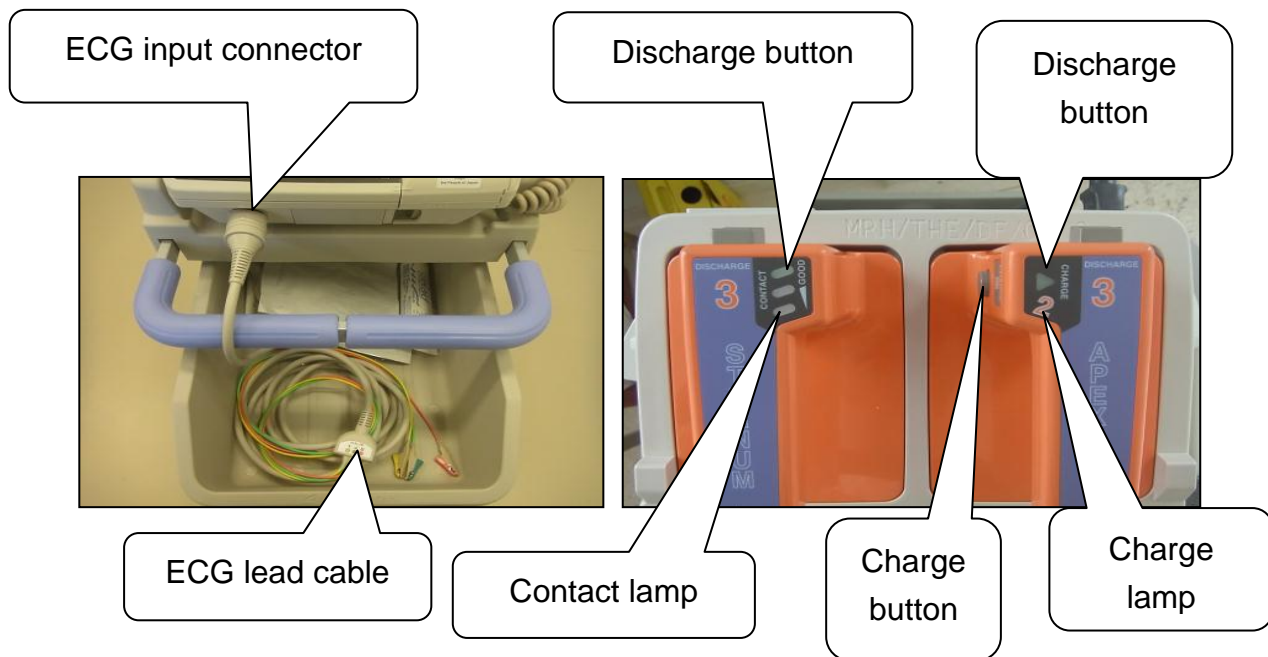
(Model No: TEC5521/ Nihon Koden)



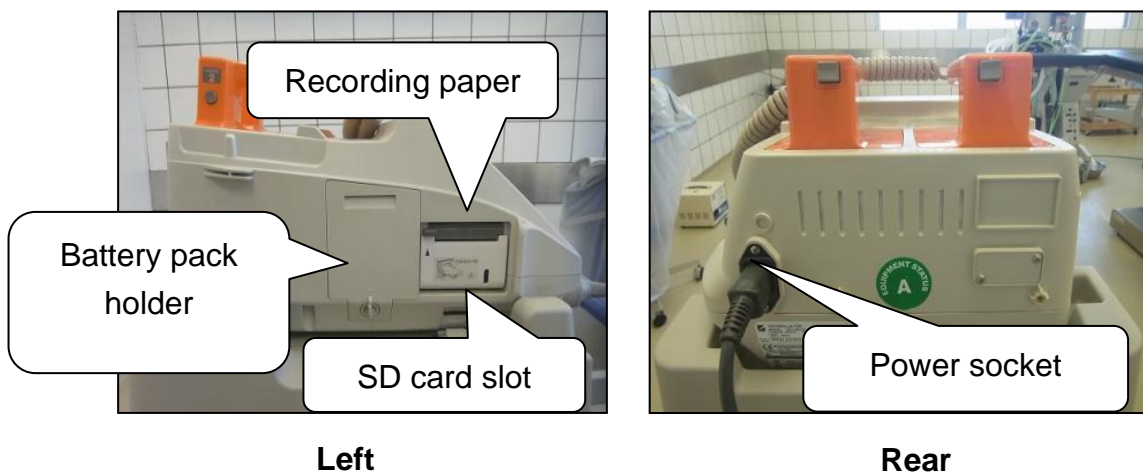
3. PARTS (TEC5521/ Nihon Koden)



(Model No: TEC5521/ Nihon Kodon)



(Model No: TEC5521/ Nihon Kodon)



4. Accessories



Gel



Recording paper



Disposable electrode

5. FUNCTION

- DEFIBRILLATION

Turn the power on the patient without electrocardiogram

Adaptation disease: **Ventricular Fibrillation (VF)**
Ventricular Tachycardia (VT)

- SYNCHRONIZED CARDIOVERSION

- Synchronize with Cardiogram

- adaptation disease: **Atrial fibrillation (Af) 、**

- **Atrial Flutter (AF) 、**

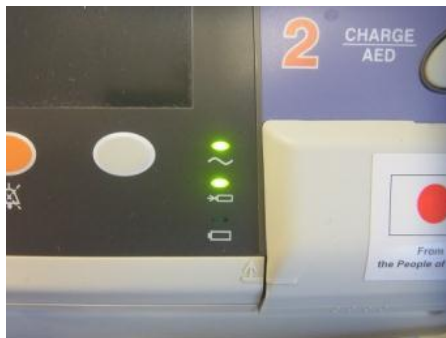
- **Ventricular Tachycardia (VT) ,**

- **Paroxysmal Supraventricular Tachycardia (PSVT)**

- AED (option)

Get power supply from...

1. AC (socket)



e.g. when it is charging

2. Charged Battery

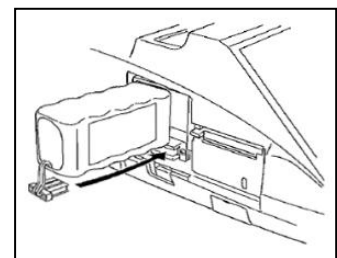
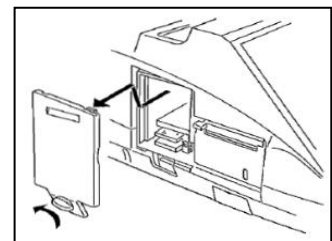
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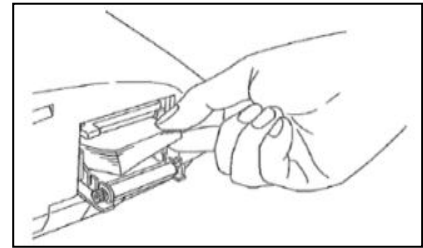
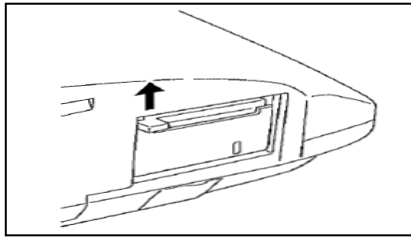


The battery

How to install / replace the Battery

- Turn OFF the power and unplug.
- Disconnect the power cable.
- Turn the knob on the battery pack holder cover counterclockwise and remove the battery pack holder cover.
- Insert the battery into the battery pack holder.
- Securely connect the battery connector to the connector until it clicks and locks.
- Write the date of battery first use.





Insert recording Paper

- A. Pull the door release lever to open the door.
- B. Set the recording paper inside the recorder with the printed side up.
- C. Draw out the paper toward you and close the door until it clicks.
- D. Press the Record key on the front panel to feed the recording paper.

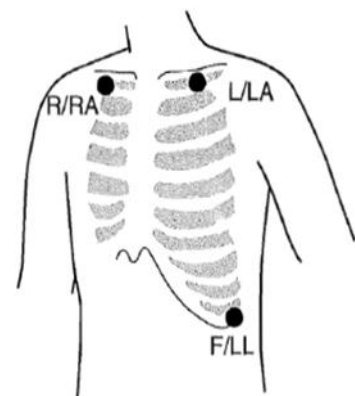
6. Preparation

This is an emergency so no wasting time.

- 1) Prepare the patient to monitor the ECG waveforms.
- 2) Always ensure the equipment is clean and in good working condition fully charged.
- 3) Connect the cables and place the electrodes in the chest.
- 4) Check that the external paddles are connected to the defibrillator.
- 5) Turn the Energy/Mode select control to the “DISARM” position to confirm that there is no error message on the screen.
- 6) Press the ECG lead key to select the lead which has the highest QRS wave. Usually “II” is selected.

- I. Connect the ECG cable.
- II. Attach the disposable electrodes to the patient.
- III. Clip the ECG connection cable to the electrode.

ELECTRODE LEADS		
<u>Symbol</u>	<u>Lead Color</u>	<u>Electrode Position</u>
R	RED	Right infraclavicular fossa
L	YELLOW	Left infraclavicular fossa
F	GREEN	Lowest rib on the left anterior axillary line

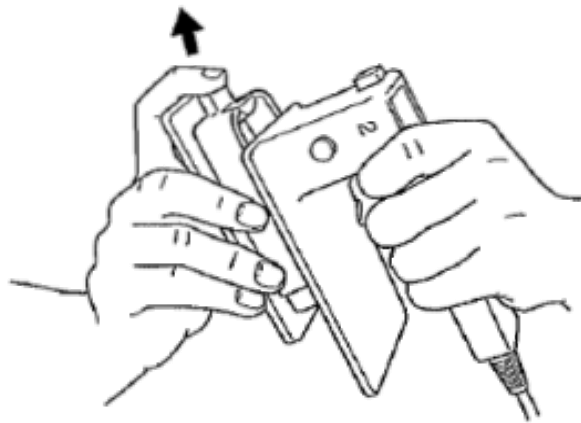


Cardio Version Synchronize with ECG

- Press the SYNC button on the front panel to select the synchronized cardio version mode. Check that the “|” mark appears on the every QRS wave.

- Prepare the paddles.
- Remove the external paddles from paddle holder.
- Apply contact gel to the electrode plate surface of each paddle.
- Gently rub the electrode plate surfaces together to evenly spread.

7) Turn the Energy/Mode Select control to the desired energy position



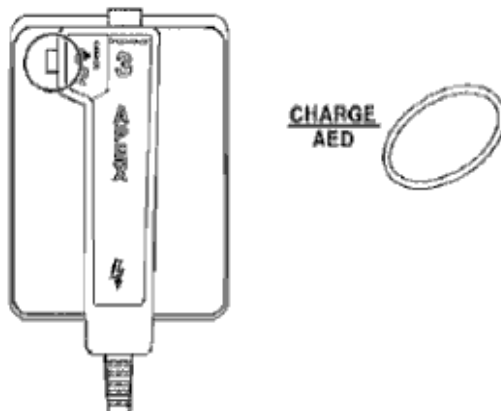
7. Operation:

Defibrillation Non-synchronize

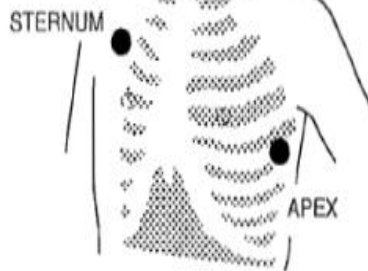
Confirm that the SYNC lamp is not lit. If it lights, press SYNC button to turn it OFF.

7-1: Place the paddles on the patient.

- Place the left (STERNUM paddle) on the right side of sternum and below the clavicle.
- Place the right (ADEX paddle) on the level of 5th intercostal space and midaxillary line.



7-2: When
paddle (



ation, press th
he front panel



APEX

Do not lean against the paddles when pressing them on the patient. A paddle may slip and cause injury.

When defibrillation becomes unnecessary after charging is completed

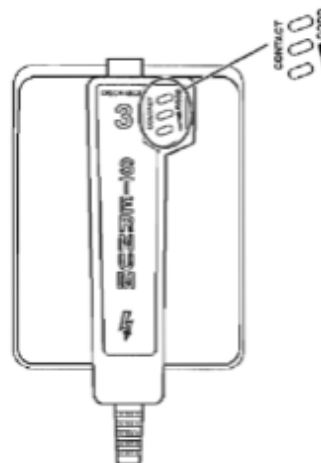
- Turn the Energy/Mode Select Control to the DISARM or OFF position.
- The defibrillator internally discharges charged energy within 20 seconds

7-3: Check the skin-paddle contact impedance:

Recommended applied pressure on a paddle is about **10kg** per paddle.

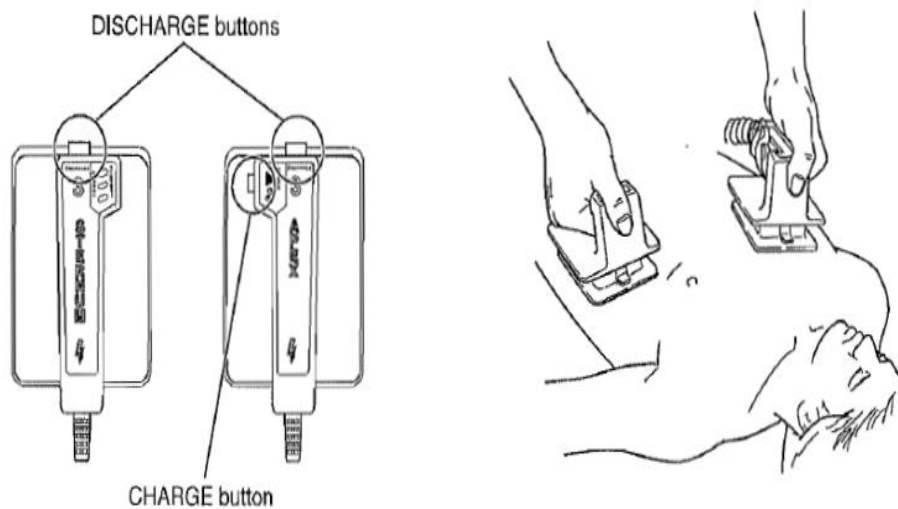
The CONTACT lamp on the STERNUM paddle indicates skin-paddle contact impedance. If the paddles green lamp does not light, do the following.

- Apply the contact gel on the paddles uniformly.
- Shave hair on the skin where paddles are placed.
- Press the paddles against the patient and gradually increase the pressure until the green lamp lights.



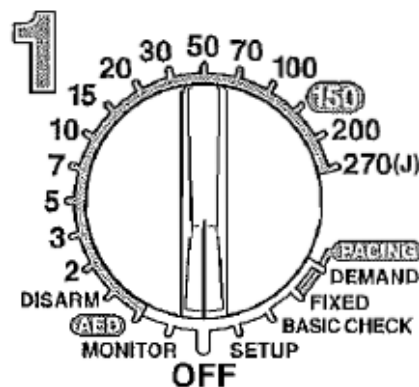
7-4. Discharge the energy to the patient.

After confirming that the CHARGE lamp is lit, simultaneously press both DISCHARGE buttons on the paddles to discharge the energy to the patient.



7-5. If another defibrillation is required, perform necessary medical treatment and repeat defibrillation.

7-6. Turn OFF the power and unplug



8. Care

8-1: Immediate care:

- 1) Remove electrodes and wipe off the gel.
- 2) Disconnect to disarm by turning anti-clockwise to zero.
- 3) Switch from the machine, stabilizer then the main and unplug.
- 4) When you set to DISARM position, "0J" is displayed on the screen.
- 5) Wipe paddles and paddle folders.

- 6) Return the machine in its zoned area.



8-2: Routine care:

- 1) Ensure the equipment is clean and in good working condition.
- 2) Lock wheels when you not in use.
- 3) Keep it in a safe place and covered.
- 4) The Energy/Mode Select control supposed to be OFF when not in use.
- 5) Accessories are kept neatly.
- 6) The maintenance should be done by a qualified technician periodically.
- 7) Keep the machine in its zoned place
- 8) In case of any fault, report to the qualified Medical technician for repair.
- 9) Hand over to next health worker on duty.
- 10) The equipment should be engraved

Note:

For pediatric (Under 8-year-old / 25kg), use the Pediatric Electrode Plate.

- 1) Turn OFF the defibrillator.
- 2) Press the tab of the adult electrode plate.
- 3) Slide the adult electrode plate forward and off.

WARNING: (to avoid an electrical shock)

- 1) When charging or discharging, do not touch anything other than the handles.
- 2) Do not move the defibrillator when charged
- 3) Do not hold the paddle in air when charged energy remains in the defibrillator.
- 4) Before defibrillation, all persons must keep off from the bed and must not touch the patient or any equipment or cable connected to the patient.
- 5) Never discharge near a person or object.
- 6) Do not perform defibrillation in a wet place.

3.27 ULTRASOUND SCANNING MACHINE

1. Definition

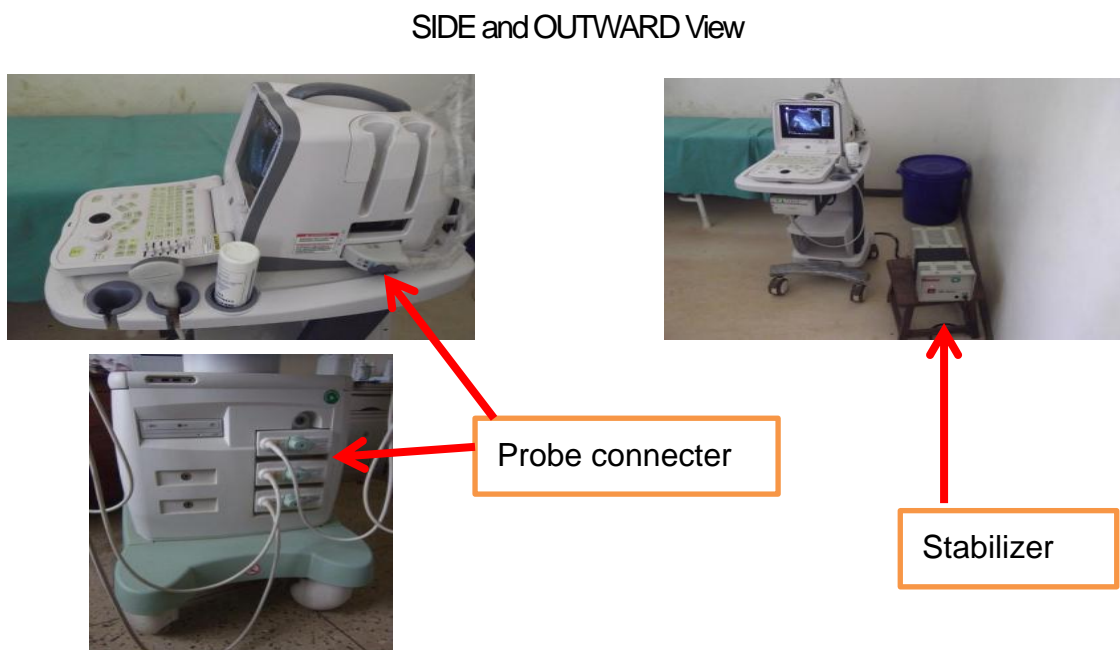
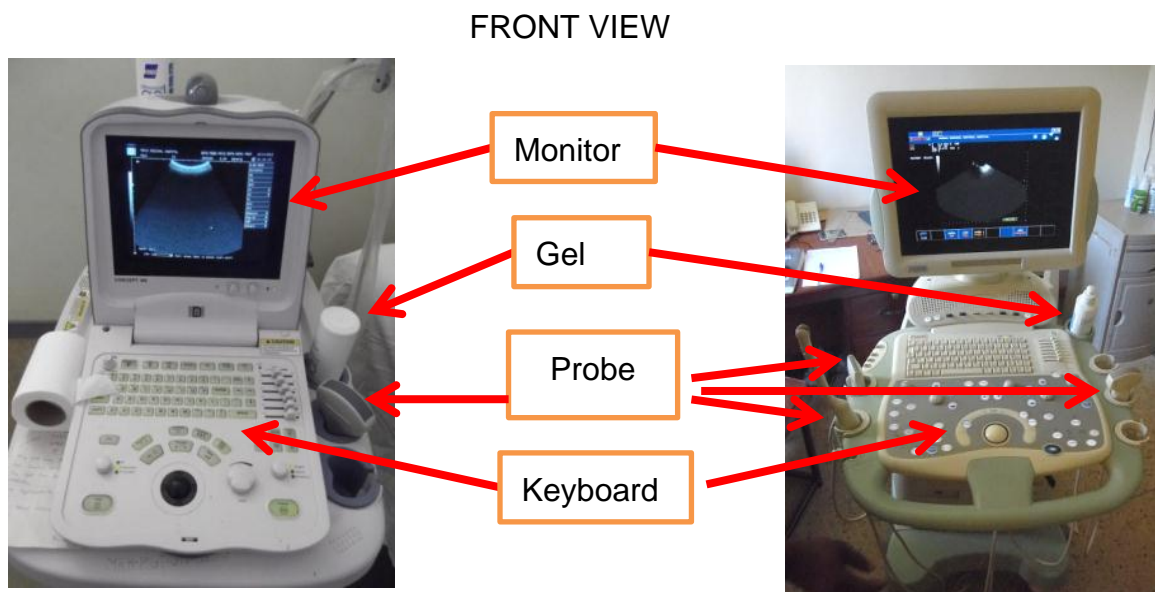
An Ultra sonograph is a Medical Equipment which uses high waves to visualize internal organs.

2. Types/Models

2-1: Echocardiogram

2-2: Obstetric Ultrasound

2-3: Carotid Ultrasound



Probes:

- There are 3 kinds of probe.



CONVEX

Radially
Abdominal organ



SECTOR

Radially
Heart & gynecology



LINEAR

Straight
Blood vessel &
Thyroid gland

Ultrasound Gel



3. Parts

- 1) Body of the machine
- 2) Keyboard
- 3) Screen or Monitor
- 4) Probe for scanning (abdominal/cardiac)
- 5) Control panel (on and off switch)
- 6) Stand
- 7) Casters

4. Accessories

- 1) Stabilizer
- 2) Cable and Top plug
- 3) Gel or Cream
- 4) Printer
- 5) Tissue for cleaning

5: Preparation

- 1) Make sure the machine is working well and is complete
- 2) Explain the procedure to the patient.
- 3) Turn on power. Make sure the initial screen is displayed.
- 4) Set the Date and Time.
- 5) Enter Patient Data.
- 6) Adjust the display contrast
- 7) Put patient in correct position supine or dorsal position is used.
- 8) Apply the gel on the site for scanning.

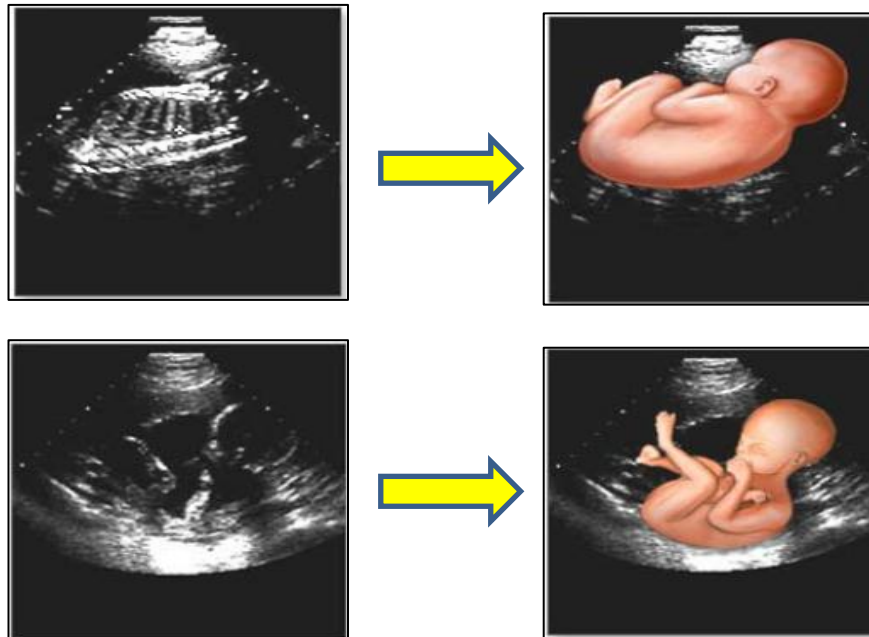
6. Operation

- 1) Switch on power
- 2) Use the proper probe to scan.
- 3) Move the probe over the desired part.
- 4) Interpretation is viewed on the monitor, as it is explained, diagnosis made and printed out.
- 5) Patient is treated according to the finding of the report.



7. Examples

Acquired Sample Image



8. Care

8-1: Immediate care

- 1) Switch off power from the machine, stabilizer and mains.
- 2) Clean the gel from the patient examined site.
- 3) Clean the probe and electrodes to remove gel and fix it in its place.
- 4) Make the patient comfortable.
- 5) Unplug the top plug from the power source

8-2: Routine care

- 1) Dump dust when used or when it is dirty.
- 2) Check if in good working condition and complete.
- 3) Cover the machine to prevent dust with
- 4) Clean cloth.
- 5) Use a stabilizer to control current.
- 6) After using the machine, remove the cream from probe always.
- 7) Keep in a safe place zoned for it.
- 8) Check for any crack on the probe connectors and rubber tubing.
- 9) The machine is to be serviced after every six months by a qualified technician.
- 10) Must be entered in the inventory and hospital asset books
- 11) In case of failure:
 - Report to immediate supervisor in charge.
 - To be operated by a trained Health worker.
 - To the qualified medical technician for repair

Note: Operation in case of emergency:

- 1) Cancel the measurement in case of a blackout, remove plug
- 2) Check the connection of the electrodes or internal wire breakage
- 3) Electrodes should be changed when damaged.
- 4) NEVER DRIO the probe down, it will crack (this is much expensive)
- 5) Use only appropriate gel meant for it.
- 6) The patient is treated according to the finding of the report.

3.28 INFUSION PUMP

1. Definition

It is a medical equipment which infuses fluids, medication or nutrients into a patient's circulator system. Infusion pumps offer significant advantages over manual administration of fluids, including the ability to deliver fluids in very small volumes, and the ability to deliver fluids at precisely programmed rates or automated intervals. They can deliver nutrients or medications, such as insulin or other hormones, antibiotics, chemotherapy drugs, and pain relievers.

2. Parts

- 1) Main unit
- 2) Control Panel
- 3) Pump door/pump lever
- 4) Drip detector
- 5) IV set
- 6) Battery pack compartment

3. Accessories

- 1) Power cable with top plug
- 2) Stand clamp (knob bolt)
- 3) I.V stand
- 4) Alarm lamp
- 5) Screen
- 6) Handle
- 7) Communication port
- 8) Hand hold
- 9) Air detector
- 10) Occlusion sensor
- 11) Tube clamp



4. Preparation

- 1) Ensure it is clean, complete and in good working condition.
- 2) Connect the power outlet.
- 3) Confirm the patient
- 4) Ensure the battery is fully charged.
- 5) Ensure the accessories are available:

5. Operation

- 1) Mount I.V set to pump

- 2) Attach drip detector
- 3) Turn power on
- 4) Set type of I.V set
- 5) Input flow rate and volume limit
- 6) Perform vein puncture
- 7) Start infusion
- 8) Finish infusion
- 9) Turn power off

6. Care:

6:1 Immediate

- 1) Remove the I.V set from the patient
- 2) Clean up the patient
- 3) Leave the patient comfortable
- 4) Unplug the top plug from the power source.

6:2 Routine

- 1) Daily dump dusting/PRN (where necessary)
- 2) Cover to prevent dust
- 3) Use a stabilizer to control current.
- 4) Hand over
- 5) Engraving
- 6) Remove from the drip stand when not in use.

Note:

- 1) Battery should be replaced after three years or when it wears off/PRN (where necessary).
- 2) Alarms may indicate:
 - Air in the tube
 - Pump door is open
 - Occlusion in the tube
 - Battery voltage is low
 - Solution container is empty

3.29 SYRINGE PUMP

1. Definition:

A syringe pump (syringe driver) is a medical equipment used to increase the convenience and safety of performing intravenous drip infusions. Some types require a syringe set specific to that manufacturer.

2. Parts:

- 1) Main unit
- 2) Control panel
- 3) Slider
- 4) Syringe clamp and slider
- 5) Clutch button
- 6) Battery pack compartment
- 7) Power pot
- 8) Stands
- 9) Handle

3. Accessories:

- 1) Power cable with a top plug
- 2) I.V stand
- 3) Screws
- 4) Syringe set





4. Preparation:

- 1) Ensure the equipment is clean, complete and in good working condition.
- 2) Set to I.V stand
- 3) Confirm patient name
- 4) Setting the syringe

5. Operation:

- 1) Connect AC power cord
- 2) Press power switch
- 3) Set syringe
- 4) Set flow rate
- 5) Set occlusion level, press two buttons at the same time to change the level.
- 6) Eliminate air from the extension tube
- 7) Start infusion

6. Care:

6:1 Immediate

- 1) Remove the I.V set from the patient
- 2) Clean up the patient
- 3) Leave the patient comfortable
- 4) Unplug the top plug from the power source.

67:2 Routine

- 1) Daily dump dusting/PRN (where necessary)
- 2) Cover to prevent dust
- 3) Use a stabilizer to control current.
- 4) Hand over
- 5) Engraving
- 6) Remove from the drip stand when not in use.

3.30 SURGICAL INSTRUMENTS

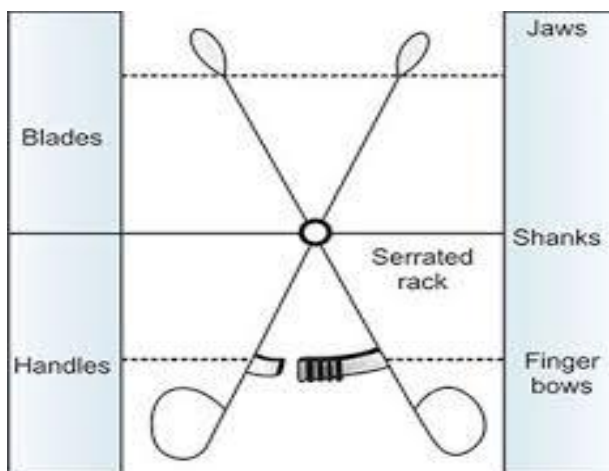
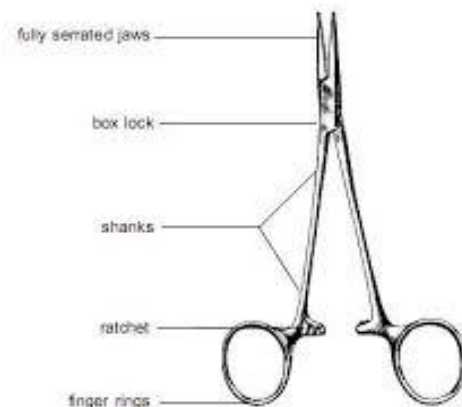
1. Definition:

Surgical instruments are tools used in surgical procedures.

2. Common surgical instruments:

- 1) Artery forceps
- 2) Towel clips
- 3) Dissecting forceps
- 4) Cord clamps
- 5) Needle holder
- 6) Scissors
- 7) Speculum
- 8) Intestinal clamps
- 9) Cheatle forceps etc.

Diagram showing parts of artery forceps:



Key:

- A = Teeth
- B = Serrations
- C = Shank
- D = Ratchet
- E = Bows
- F = Joint or Box

INSTRUMENT CYCLE:



General Care:

- 1) Before use make sure instruments are clean, sterilized and in good working condition.
 - 2) Always clean instruments by use of soft plastic brush or toothbrush.
 - 3) Always emphasize on Serrations, Joint and Ratchets while cleaning.
 - 4) Keep instruments in their proper places/gazzeted place.
 - 5) Take broken instruments for replacement.
 - 6) New instruments should first be washed then sterilized before use.
 - 7) Pack instruments according to their sets/purpose.
- Use the surgical instruments for the purpose intended.

Note:

- 1) Never cut gauze, adhesives with surgical scissors.
- 2) Never use surgical forceps as openers or pliers.
- 3) Do not use steel wire for scrubbing as it shortens its life span.
- 4) Avoid dropping equipment from a height e.g. table or sink.
- 5) Bumping, resting on instruments and bending them must be avoided.
- 6) If instruments are in contact with corrosives or caustic agents wash immediately.
- 7) Prolonged contact of instruments with physiological saline leads to rust., Always decontaminate surgical instruments soon after use.

Supported by:

