



The Republic of Uganda
MINISTRY OF HEALTH

Medical Equipment User Training Manual
for
National and Regional User Trainers

*A User Training guide for
National and Regional User Trainers*

December 2013

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.

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 prolong the lifespan of medical Equipment in the facilities and hence reduce the cost of repair and replacement of the Equipment thereby saving government money.

Special thanks go to Japan International Corporation Agency for initiating the preparation of the second edition of the Medical Equipment Users' Manual and to the User Trainers for editing it.

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



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Acronyms

List of Acronyms and Abbreviations

ACHS(HI)	Assistant Commissioner for Health Services, Health Infrastructure Division,
AHSPR	Annual Health Sector Performance Report
ARV	AIDS-associated retrovirus
ASSIST	Applying Science to Strengthen and Improve Systems
BTC	Belgian Technical Cooperation
BUT	Basic User Trainer
CME	Continuing Medical Education
CSO	Civil Society Organisation
CWS	Central Medical Equipment Maintenance Workshop
CQI	Continuous Quality Improvement
DANIDA	Danish International Development Agency
DHOs	District Health Officers
DUT	District User Trainer
GH	General Hospital
HC	Health Center
HID	Health Infrastructure Division
HMIS	Health Management Information System
HUT	Hospital User Trainer
HSSIP	Health Sector Strategic and Investment Plan
JICA	Japan International Cooperation Agency
JCC	Joint Coordination Committee
JOCV	Japan Overseas Cooperation Volunteer
JRM	Joint Review Mission
MCH	Maternal and Child Health
ME	Medical Equipment
MoFPED	Ministry of Finance, Planning and Economic Development
NACME	National Advisory Committee on Medical Equipment
NGO	Non-Governmental Organizations
NHA	National Health Assembly
NO	Nursing Officer
NUT	National User Trainer
OPD	Out Patient Department
PS	Permanent Secretary
PDM	Project Design Matrix

PPDA	Public Procurement and Disposal of Public Assets Authority
PPM	Planned Preventive Maintenance
Project	The Project on Improvement of Health Service through Health Infrastructure Management
PHA	Principal Hospital Administrator
QAD	Quality Assurance Department
QIFSP	Quality Improvement Framework and Strategic Plan
QIP	Quality Improvement Partner
QI	Quality Improvement
QIT	Quality Improvement Team
R/D	Record of Discussion
RRH	Regional Referral Hospital
RUT	Regional User Trainer
RWS	Regional Medical Equipment Maintenance Workshops
SPNO	Senior Principal Nursing Officer
SUT	Senior User Trainer
TOT	Training of Trainers
TQM	Total Quality Management
USAID	United States Agency for International Development
UT	User Trainer
WIT	Work Improvement Team
WS	Medical Equipment Maintenance Workshop
5S	Sort-Set-Shine-Standardize-Sustain

Table of Contents

Foreword	i
Acknowledgement.....	ii
Acronyms	iii
MEDICAL EQUIPMENT USER TRAINING MANUAL	1
1.0 Introduction	1
1.1 Background	1
1.2 Objectives.....	2
1.3 Stakeholders	2
1.4 Organization Structure	4
2. USER TRAINING MANUAL.....	6
2.1 INTRODUCTION.....	6
2.2 LIST OF MEDICAL EQUIPMENT COVERED IN THE MANUAL.....	6
2.3 GENERAL MANAGEMENT OF MEDICAL EQUIPMENT	7
2.4 AUTOCLAVE	8
2.5 BOILER	13
2.6 TABLE TOP ELECTRICAL AUTOCLAVE.....	16
2.7 OXYGEN CYLINDER SET.....	19
2.8 OXYGEN CONCENTRATORS	22
2.9 VACUUM EXTRACTOR	25
2.10 OPERATING TABLE	28
2.11 NEBULIZER.....	30
2.12 SUCTION MACHINE.....	33
2.13 SPHYGMOMANOMETER (BLOOD PRESSURE MACHINES)	36
2.14 WEIGHING SCALE.....	39
2.15 RESUSCITATOR	42
2.16 RECOVERY BED	45
2.17 PULSE OXIMETER.....	47
2.18 MANUAL VACUUM ASPIRATOR (MVA)	49
2.19 INFANT WARMER	53

2.20 INFANT INCUBATOR.....	56
2.21 HOT AIR OVEN.....	59
2.22 ELECTROCARDIAGRAM (ECG).....	62
2.23 FETAL DOPPLER.....	66
2.24 VERTICAL AUTOCLAVE.....	68
2.25 DIATHERMY.....	70
2.23 BLOOD GLUCOMETER.....	72
2.27 PATIENT MONITOR.....	75
2.28 DEFIBRILLATOR.....	78
2.29 ULTRASOUND.....	86
2.30 Use full table.....	90
3. 5S ACTIVITY.....	93
3.1 What is 5S?.....	93
3.2 5S in Uganda.....	93
3.3 Practical hints for five steps.....	94
1S: SORTING / Elimination.....	95
2S: SETTING/Material Handling.....	96
3S: SHINING/ Regular maintenance and cleanliness.....	99
4S: STANDARDIZE/Improving quality of care.....	100
5S: SUSTAIN/Teamwork.....	101
4. SUPPORT SUPERVISION AND MONITORING.....	102
4.1 POLICY.....	102
4.2 FREQUENCY.....	102
4.3 MONITORING SHEET.....	103

MEDICAL EQUIPMENT USER TRAINING MANUAL

1.0 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, 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.

1.1 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 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 was 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.
After that report, Sixteen (16) user trainers were identified from eight (8) health facilities namely, Arua RRH, Hoima RRH, Lira RRH, Mbale RRH, Masaka RRH, Kabale RRH, Moroto RRH and Entebbe GH. They were trained as trainers for two (2) years on Basic Medical Equipment and some advanced equipment. These trainers are now training the Equipment users in their respective Hospitals.

1.2 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.
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 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.

1.3 Stakeholders

- Ministry of Health (MoH)
- Hospital Manage
- District Health Officers
- User Trainers
- Equipment Users
- Development Partners

1.3.1 Roles of Stakeholders

1.3.1.1 Ministry of Health

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

Roles:

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

1.3.1.2 Hospital Manage

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

Roles:

- To identify equipment required
- Allocate funds for procurement of equipment
- Purchase the required equipment
- Ensure the right equipment is procured
- Organize training for Equipment users

1.3.1.3 District Health Officers

Their roles are the same as those for Hospital manage

1.3.1.4 User Trainers

These includes the senior user trainers and the user trainers

Roles

- To ensure that equipment users are trained
- To make sure the equipment users are able to identify Equipment in their units by name
- To make sure the equipment users are able to identify faulty Equipment and report to the medical technician
- Help the hospital management to identify necessary Equipment for optimal operation of the facility
- They participate in inventory keeping in the facilities regularly

1.3.1.5 Equipment Users

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

Roles

- To ensure that all medical equipment is being utilized properly without causing any malfunction or failure.

- To identify all the equipment in their units by name
- To identify faulty equipment and report to the immediate in charge or user trainers who will contact the medical Technician.
- To use the right equipment for the right purpose
- To have positive attitude towards proper use and care for medical equipment
- To carry out inventory keeping in their own units regularly without being reminded
- 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.

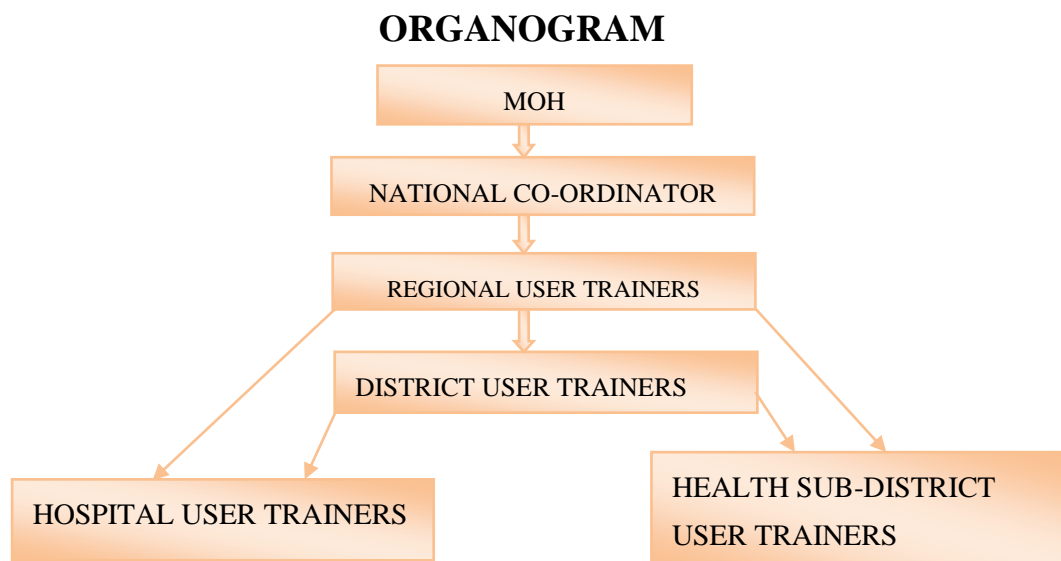
1.3.1.6 Partners

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.

1.4 Organization Structure

At the central level, the 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



1.4.1 The roles of different User Trainers:

1.4.2 National User Trainer: -

- Trains the Regional and District User Trainers
- Monitors the activities of Regional User trainers
- Carries out support supervision to RUTs, DUTs and HUTs.
- Handles administrative issues in the User Training Office.

1.4.3 Regional User Trainers: -

- Trains the District User Trainers and Hospital User Trainers together with the National User Trainer
- Trains the equipment users in their respect hospitals.
- Carries out support supervision to the Districts User Trainers in their region.

1.4.4 District User Trainers: -

- Trains the Health Sub-District User Trainers.
- Trains the equipment users in all Sub Districts and all Hospitals and Health Centres in their Districts together with Hospital User Trainers
- Carries out support supervision in all Hospitals and all Health Centres.

1.4.5 Hospital User Trainers: -

- Trains the equipment users in their hospitals and all Health Centre together with the District User Trainers.

2. USER TRAINING MANUAL

2.1 INTRODUCTION

The medical equipment user training manual is specifically for the user trainers, who will be responsible for training equipment users in the health facilities.

2.2 LIST OF MEDICAL EQUIPMENT COVERED IN THE MANUAL

No.	Name of Equipment	Manual No.	Revision No.	Date	Number of sheets
1	Autoclave	ACL001	100-01		
2	Boiler	BOI001	100-01		
3	Table Top Autoclave	TTA001	100-01		
4	Oxygen Cylinder	OXC001	100-01		
5	Oxygen Concentrators	OXY001	100-01		
6	Vacuum Extractor	VET001	100-01		
7	Operating Table	OPT001	100-01		
8	Nebulizer	NEB001	100-01		
9	Suction Machine	SUC001	100-01		
10	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	Ultrasonography	ULT001	100-01		

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.
3. Entered in the inventory book, and updated regularly.
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 (PPM – Planned Preventive Maintenance) 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
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.
14. All Electrical equipment must use the stabilizers.
15. Equipment not in use must be, labeled, wrapped and checked regularly.
16. Avoid using hard water for sterilization, and other procedures.
17. Obsolete equipment should be disposed off not left in unit.
18. Ensure safe storage of the medical equipment.

19. Formula for mixing JIK :
$$\left[\frac{\text{Given Concentration}}{\text{Required concentration}} \right] - 1 \quad \text{E.g} \quad \left[\frac{6\%}{0.5} \right] - 1$$

2.4 AUTOCLAVE

1: Definition

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

2: Types

2-1: Portable: Can be Electrical or Non-Electrical.

2-2: Fixed or stationed is strictly Electrical only (Model can be Horizontal or Vertical).

(Electrical Autoclave can be manual or digital and can be electrical or non-electrical)

3: Parts

3-1: Non-Electrical (Portable)



3-2: Main body

1. Slotted equipment tray
2. Rack – is used for supporting the sterilizing drum/basket
3. Knobs/bolts 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 where water should stop.

3-3: 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 or temperature)
3. Pressure relieve 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
2. Autoclave tape – Sterilizing tap
3. Timer/wall clock/watch for timing sterilization

5: Electrical Table Top



5-1: Parts

1. Body
2. Water Reservoir with the cover
3. Air Jet inside the reservoir
4. Safety valve in the water reservoir
5. Door with gasket and handle
6. Door micro switch
7. Bolts/Door handle
8. Water drain valve
9. Stand

5-2: Control Panel

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

5-3: Inside/Chamber

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

6: Accessories

1. Cable and Top plug
2. Stabilizer
3. Sterilizing tapes

7: 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/Rain Water) to the level indicator or according to the operating guidelines.

8: Operation

1. Check water level in the chamber
2. Load the autoclave with sterilizing basket, drum or packs.
3. Put on the lid or close door and tighten.
4. Put on the source of heat or switch on power.
5. Open the steam valve or air screw.
6. After continuous flow of steam for 5 minutes, close the steam valve or air screw.
7. 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).

9: Care

9-1: Immediate Care

1. Switch off the power from the machine, stabilizer and main socket,
2. Open the steam valve and let the autoclave cool to “0” pressure before opening the lid or door.
3. Unscrew the door handle/bolts to open the lid or door.
4. Using sterile cheatle 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 rain water or tap water change daily and distilled water change weekly).

9-2: Routine Care

1. Ensure it is clean inside and outside and in good working condition.
2. 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.

Note:

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) (non-hollow instruments) - kidney dishes.
2. Porous loads – materials which contain air e.g. drapes, wrapped instruments hollow instruments.
3. Do not use steel wire for scrubbing but instead use vim when necessary.
4. Use a clean cloth for cleaning the Autoclave.
5. After sterilization excess pressure should be released immediately, so that the items can dry in the autoclave.
6. Auto claves should not be left unattended to when in use.
7. When power goes off switch off from the main source. Restart the procedure if power comes back.

8. Load items correctly to ensure successful sterilization.
9. Cold air affects the effectiveness in killing micro-organisms thus rendering sterilization inadequate.
10. After sterilization allow the machine to cool for 20 minutes before starting another procedure or cycle.
11. Change gasket when worn out or every year.
12. Never use gauze for cleaning the Autoclave.

2.5 BOILER

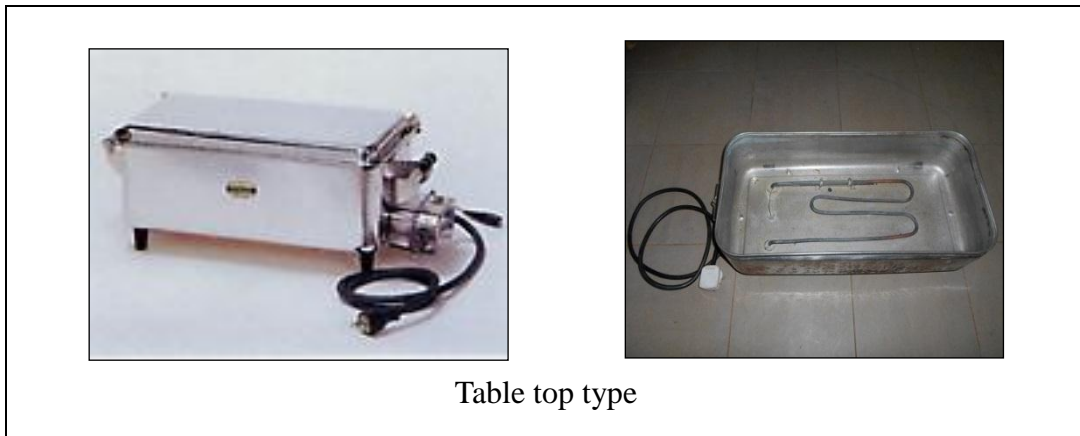
1: Definition

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. In case of non-electrical – timer

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.
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
4. Don't add instruments or water in the middle of procedure.

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 cheatele 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.

Note:

1. Do not over boil the instruments.
2. Do not leave the instruments in water.
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 the boiler from the socket when not in use.
6. Don't leave the Boiler unattended to.
7. Clean the boiler daily with soap and rinse with clean water.
8. Use rain or clean tap water (change rain water every after two days and tap water

change it daily).

9. Do not add or remove instruments before the procedure is complete.
10. Keep in a designated area.

2.6 TABLE TOP ELECTRICAL AUTOCLAVE

1: Definition

Table Top 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

2-2: Fixed (cable fixed on the wall and the size of the equipment that makes it be fixed in one place)

Horizontal designs

Fixed

Portable



3: Parts

1. Body (main)
2. Front and behind stand
3. Water reservoir cover
4. Water reservoirs – (inside it air Jet – to expel cold air; Safety valve – to expel excess pressure, Reservoir water drain valve)
5. Electrical cables with top plug.
6. On and Off Switch
7. Control panel with knobs for different programs and light indicators.
8. Pressure gauge
9. Door cover with gasket
10. Micro Door Switch
11. Window display

12. heating element with a sensor
13. Chambers
14. Sterilizing tray holder
15. Slotted trays

4. Preparation

1. Make sure equipment is clean inside and outside.
2. Should be in good working condition
3. Should be on a firm flat surface e.g. table
4. Fill water reservoir to required level.
5. Only use distilled/rain water for sterilization.
6. Load/pack the items to be sterilized.

5: Operation

1. Connect to the power source
2. Load the autoclave with items correctly to ensure successful sterilization.
3. Switch on power.
4. Press or turn knob to fill in water into chamber.
5. Select the temperature and drying time.
6. When the process is complete it switches off itself then put off power from the main source.
7. Release the steam from the Autoclave

6: Care

6-1: Immediate care

1. Switch off from the equipment, stabilizer and the main source and unplug.
2. Allow cooling
3. Use sterile cheattle forceps for removing instruments from the Autoclave

6-2: Routine care

1. Daily dump dust with soapy water and dry it.
2. Ensure the gasket is clean and smooth.
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.

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

1. Once every month clean and check the safety valves.
2. Replace the door gasket every 12 months or as needed.
3. 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. Ensure it is on a hard surface and flat.
4. Only use low mineral water or distill water
5. Should be used by trained person.
6. Make sure it is well connected.
7. Do not leave the autoclave unattended to while operating.
8. Do not over pack the autoclave.

2.7 OXYGEN CYLINDER SET

1: Definition

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

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. Oxygen cylinder carrier
2. Cylinder stand
3. Humidifier bottle
4. Tubing
5. Face masks in different sizes
6. Nasal catheters
7. Spanner
8. Oxygen Key

4: Preparation

1. Identify the right cylinder
2. Make sure the oxygen cylinder set is clean, complete and in good working condition.
3. Check that the Humidifier bottle has distilled/rain water to the required level.
4. Fit the manometer to the cylinder by tightening the connecting nut clockwise with use of 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.

5: Operation

1. Explain to the patient/relative
2. Connect the nasal catheter/facial mask from the Humidifier bottle to the patient.
3. Regulate the oxygen supply on the flow meter according to the prescription.
4. The duration depends on patients' condition.
5. 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 facial mask/nasal catheter from the patient.
3. Disconnect, discard/decontaminate the nasal catheter.
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 regulator.

6-2: Routine care

1. Check whether the Oxygen cylinder set is in good working condition.
2. Daily dump dusting using soapy 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 and spanner is available.
7. If empty, label and take to the store for refill.

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 of danger. showing danger) E.g:



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 right manometer for the right cylinder.
4. Make sure that the filter in the humidifier bottle is cleaned regularly.
5. Ensure that oxygen key and spanner are easily accessible.

2.8 OXYGEN CONCENTRATORS

1: Definition

Oxygen Concentrator is Medical Equipment which has the mechanism of capturing oxygen from within the surrounding atmosphere to provide patients with reliable oxygen.

2: Types

2-1: Domestic type i.e. has one Humidifier bottle and one flow meter basically for home use.

2-2: Commercial type i.e. has two Humidifier bottles and two flow meters can serve two patients at the same time.

Commercial



Domestic



3: Parts

1. The Body: This comprises of all the external parts.
2. On/Off Switch: switch on and off the concentrator.
3. The flow meter: 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. Humidifier Bottle: This contains distilled water which moistens Oxygen since dry Oxygen irritates and ulcerates the Airway.

4: Accessories

1. Cable with a Top Plug
2. Stabilizer
3. Tubing
4. Face mask and nasal catheters
5. Connectors
6. Filters

5: Preparation

1. Make sure equipment is clean, complete and in good working condition.
2. Put distilled water in the humidifier bottle.
3. Connect the long tubing to the 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 the 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 tubing, facial mask/nasal catheter to the Humidifier and then 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

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 dusting of the machine with a damp cloth.
2. Inspect the gross particle on the filter for any dirt. If any dirt, clean as follows:-
 - a) Detach the filter from the concentrator and replace with a clean one.
 - b) Wash the filter with soapy water, rinse in clean water, gently squeeze out the excess water and air dry.
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 tubes 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 machine.
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).

2.9 VACUUM EXTRACTOR

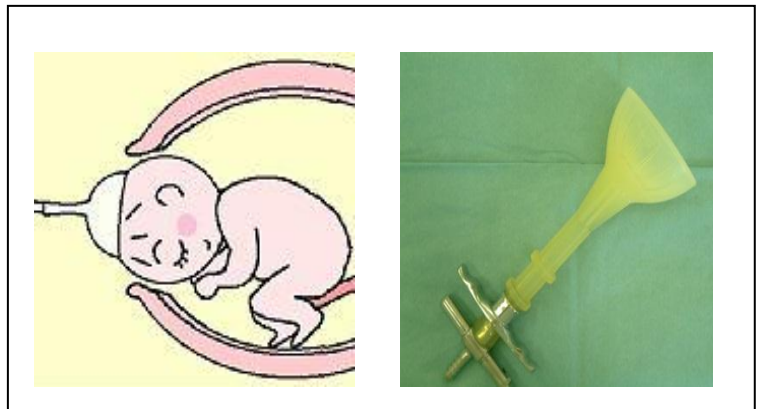
1: Definition

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

2: Types

2-1: Manual

2-2: Electrical



3: Parts

3-1 Parts (Electrical)

1. Body
2. On and off switch
3. 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)

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
7. Vacuum Release valve
8. Silicon rings with chain
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 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. Should be operated by two people.
3. Lubricate the piston of the pump regularly.
4. The pump should not be sterilized or boiled.

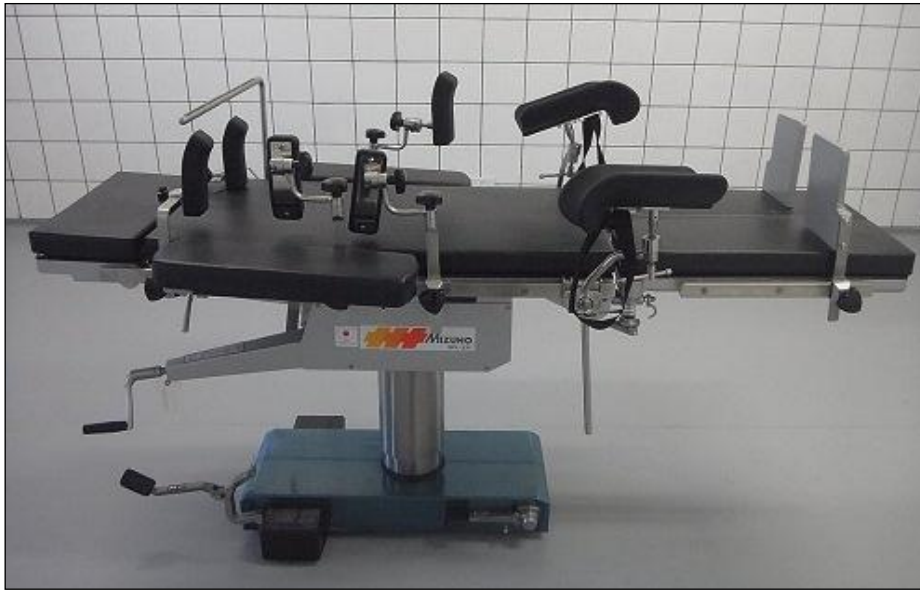
2.10 OPERATING TABLE

1: Definition

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

2: Types

- | | | |
|-----------------|---|-----------|
| 2-1: Electrical | } | Hydraulic |
| 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 – 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 – Is used to make 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.
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. Decontaminate for 10 minutes, 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 all times covered with dry mackintosh.
2. Check for the functionalities of the table daily
3. Ensure that the table is always complete

7: Maintenance

1. Put hydraulic oil when necessary.
2. After use, decontaminate, clean with soapy water, rinse with clean water.
3. Never pour water or Jik on the table when cleaning.

Note:

1. Never put a patient on the table which is not disinfected.
2. The table must be operated by trained personnel.

2.11 NEBULIZER

1: Definition

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

2: Types

2-1: Electrical

2-2: Manual

-1 Electrical



-2 Manual



3: Parts

1. Main Body
2. Air inlet
3. Filter
4. Compressor Unit
5. Rubber stands

4: Accessories:

1. Medicine pot/chamber
2. Cable with top plug (Electrical)
3. Patient mask
4. Rubber tubing (Electrical)
5. On and off switch
6. Handle
7. Stabilizer

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. Place the face mask over the patient's mouth and nose and place the strap over her/his head.
5. Ensure that Nebulizer chamber is in upright position
6. Plug in the socket
7. Switch on from the main, stabilizer then on the Nebulizer.
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. Switch off the Nebulizer, stabilizer then the main switch and un-plug.
2. Disconnect Nebulizer port from the tubing's (depending on the type).
3. Wash the Nebulizer pot in warm soapy water and rinse thoroughly with clean water after every use.
4. Reconnect the Nebulizer port to the tubing and blow air from the compressor unit through it for a few seconds.
5. Decontaminate the patient's mask, wash with soapy water and rinse with clean water
6. Leave the mask to dry
7. 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.

2.12 SUCTION MACHINE

1: Definition

Suction Machine is 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
4. Stopper

5. Ball valve
6. Spare tube connector
7. Cap
8. Suction tube nipple (inside the bottle)
9. Tubing between ball valve/angle piece
10. Silicone rubber tubing
11. Angle piece
12. Silicone rubber suction tubing
13. Suction tip with vent hole

3-2. Parts: (Electrical)

1. Collecting bottles
2. Body and the Handle
3. Foot pedal
4. On and off switch
5. Pilot lamp
6. Vacuum adjustment control
7. Pressure gauge/Vacoumeter
8. Two way cock/plunger
9. Wheels/casters with a lock
10. Bacterial filter
11. Patient connector
12. Suction tubing's
13. Electric cable and plug
14. Sensor bottle

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.
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, bottles and empty the content
5. Decontaminate the bottles and tubes.
6. 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

Note:

1. Electrical suction machine is not recommended for infants because of the high pressure.
2. There is a pressure low suction machine for babies.

7: Manual type

7-1 Preparation: Same as electrical

7-2 Operation:

1. Put little water in the bottles.
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 flows.
2. The manual type is recommended for children and babies because of less pressure.

2.13 SPHYGMOMANOMETER (BLOOD PRESSURE MACHINES)

1: Definition

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

2: Types



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 relief 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 - Provision for batteries (digital type)
12. Control panel (digital type)
13. Mercury tank/reservoir (mercury 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).
10. Take the second reading when the sound of the pulse begins to fade. This is the diastolic pressure. (mercury & aneroid).
11. Open the pressure relief valve to release the air completely.(mercury and aneroid)
12. Remove the cuff from the patient's/client's arm
13. Record the results i.e. BP = Systolic pressure (mmHg)
Diastolic pressure

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 split or pour (mercury type only)
4. Close the case and keep in the safe place.

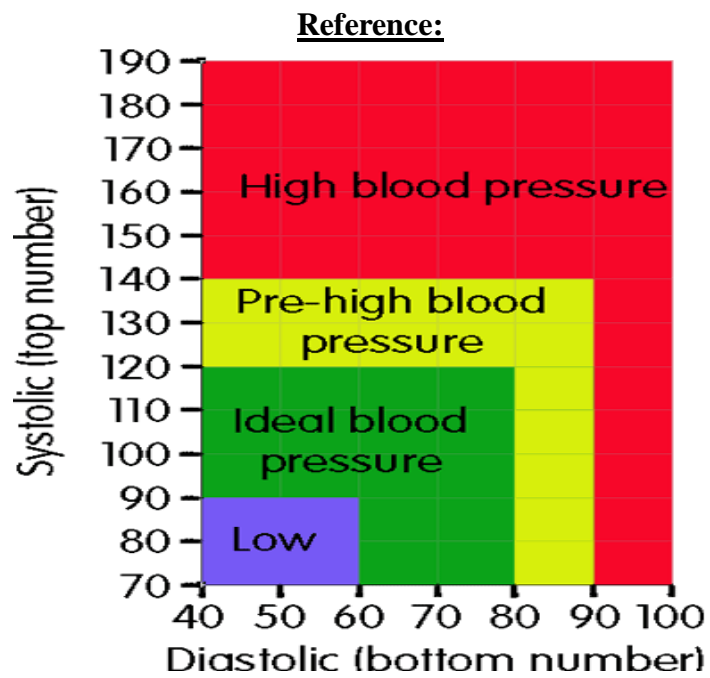
6-2: Routine Care

1. Dump dust the case with soapy water and leave it dry.
2. Make sure the machine is in good working condition by checking:
 - 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.



2.14 WEIGHING SCALE

1: Definition

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

2: Types

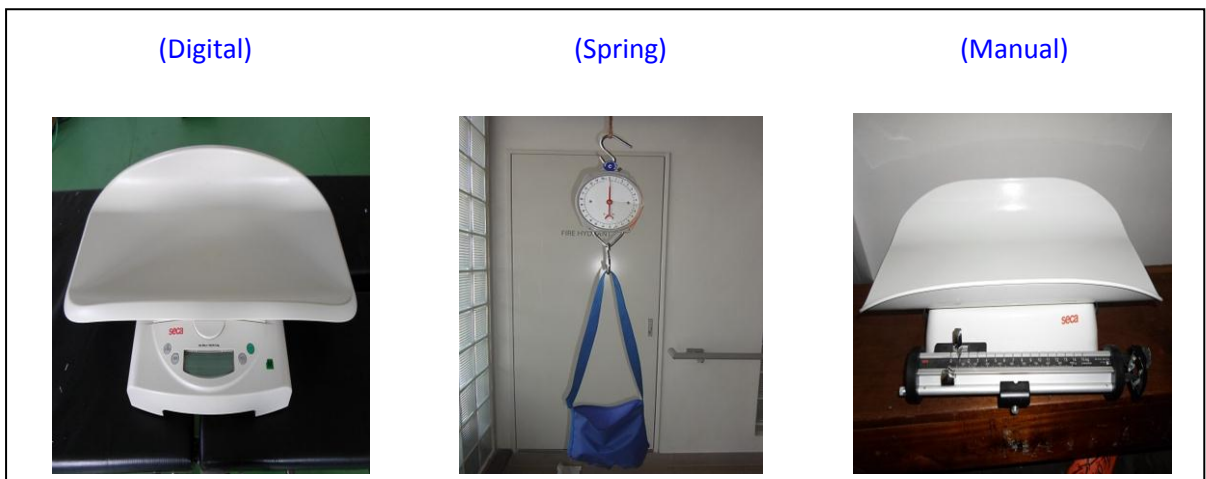
2-1: Infants

2-2: Adults

-1: Infants:

Types of infant weighing scales:

1. Digital
2. Spring
3. Manual



-2: Adults:



3: Parts:

1. Tray
2. Body
3. Scale with indicators
4. Weight indicators (manual)
5. Locks (some model)
6. Control panel (digital)
7. Provision for batteries (digital)
8. Adjusting screw (manual)
9. Hook (spring)
10. Height measure

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 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. Scale should be at eye level (spring)

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 scale is on a 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.

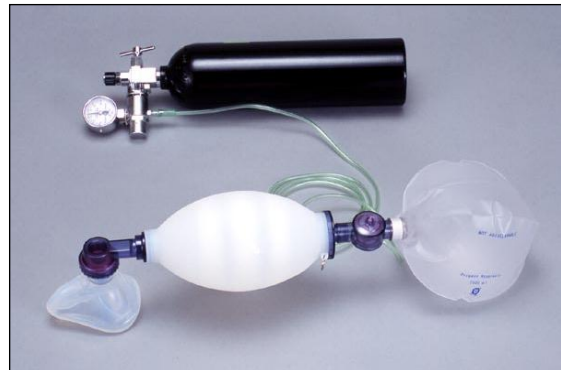
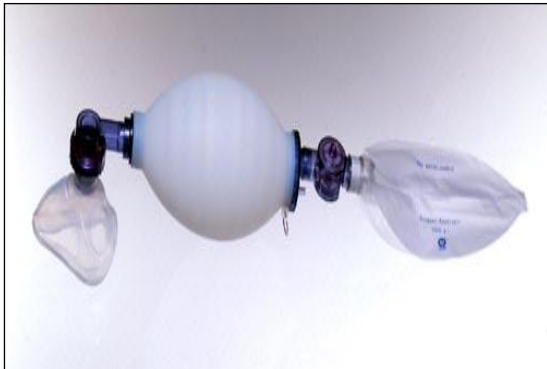
2.15 RESUSCITATOR

1: Definition

Resuscitator is medical equipment used to restore respiration (as to a partially asphyxiated person) i.e. it is to bring back a person to consciousness.

2: Types

2-1: Infant



2-2: Adult



3: Accessories

1. Airway piece
2. Tracheal tubes
3. Bulb syringe
4. Laryngoscope
5. Oxygen cylinder

4 : Parts: (A Set contains)

1. Face masks (different sizes).
2. Self-inflating bag with air reservoir (different sizes)

3. Oxygen connector
4. Airway piece (different sizes)
5. Tracheal tubes (different sizes)
6. Diaphragm
7. Bulb syringe
8. Laryngoscope
9. Oxygen cylinder

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.
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/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, 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 machine is clean, complete and in good working condition.
2. Check for cracks in tubes and ambu bag
3. Refill oxygen cylinder whenever empty.

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).

2.16 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 beddings
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
2. Make the bed with clean beddings.
3. The casters must be cleaned and locked before 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

2.17 PULSE OXIMETER

1: Definition

Pulse Oximeter is medical equipment used for monitoring the patient's/client's pulse and oxygen concentration in the Blood circulation.

2: Types

2-1: Desk top - Electrical

2-2: Sports pulse Oximeter (non-electrical)



3: Parts of Pulse Oximeter

1. Body
2. Control panel
3. Control knob
4. Cable and top plug
5. On/off switch
6. Battery compartment
7. Screen
8. Charger

4: Accessories

1. Finger probe (adult and children)
2. Skin sensor
3. Finger probe cable

4. Cable and Top plug
5. Connector

5: Preparation

1. Ensure that the Pulse Oximeter is on a firm 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 patients finger (index)
4. Read the pulse and the amount of oxygen in the blood.
5. Record the readings. (Normal pulse 60 to 100 bpm, Normal oxygen concentration 90 to 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.
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.

2.18 MANUAL VACUUM ASPIRATOR (MVA)

1: Definition:

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

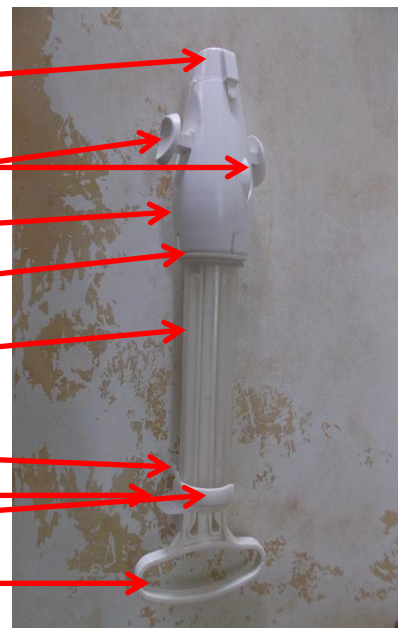
2: Types

2-1: Single Valve (IPAS MVA)

2-2: Double Valves (IPAS MVA PLUS)

3: Parts

1. Cup
2. Valve layer{
3. Valve buttons
4. Valve
5. Plunger & o
ring
6. Cylinder
7. Clip
8. Cylinder base
9. Collar stop
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 adaptor

INDICATIONS

- ▶ Treatment of incomplete abortion
- ▶ Missed abortion
- ▶ Therapeutic termination of gestation 12weeks

CONTRA INDICATIONS

- ▶ Incomplete abortion of gestational period above 12weeks
- ▶ Incomplete abortion with uterine fibroids
- ▶ Acute pelvic infection bleeding disorders

4: Accessories:

1. Cusco's
2. Sponge holding forceps
3. Tarnaculum
4. Speculum
5. GEL
6. Sterile gloves
7. Sterile gauze
8. Gallipots
9. Lignocaine
10. Syringes and needles
11. Cannula in different sizes
12. Dilators in different sizes

5: Preparation

1. Ensure the equipment is complete and in good working condition.
2. Assemble the equipment and make it ready for the procedure.
3. Prepare the patient for the procedure.
4. Always ensure there are two nurses for the procedure
5. Assemble the parts of MVA

6: Operation

1. Make patient comfortable
2. Position the patient in lithotomy
3. Swab the valva
4. Observe a septic techniques
5. Insert Cusco vaginal speculum
6. Stabilize the cervix using teneculum
7. Clean the cervix
8. Inject lignocaine in the cervix [cervical block]
9. Insert the cannula into cervical Os
10. Connect the syringe to the cannula
11. Aspirate the content of conception until signs of completion are seen: -
 - Bright red blood
 - Gritty sensation
 - Cannula griped by the cervix

12. Leave the mother comfortable

7: Care

7-1: Immediate care:

1. Detach syringe, empty content in a bowel
2. Re-attach the cannula to the syringe
3. Rinse the syringe and cannula by drawing the de contaminant
4. De contaminate three times
5. Disassemble and decontaminate in 0.5% Jik for 10 min, wash in soapy, then rinse in clean water pack for autoclave.
6. 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 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.

2.19 INFANT WARMER

1: Definition

Infant warmer is 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. Cable with top plug
2. Power on/off switch
3. Power indicator lamp
4. Heater Module or 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: 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.

5: 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.
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.

6: Care

6-1: 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.

6-2: 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 the Halogen Bulbs even if it is only one which has blown.
5. Report immediately any fault to immediate supervisor.

7: 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 light before use.
5. Turn off the main switch when not in use.

2.20 INFANT INCUBATOR

1: Definition

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

2: Types

2-1: Portable

2-2: 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. Cable with top plug.
8. On/Off Switch.
9. Humidifier tray
10. Fresh air inlet/outlet.
11. Thermometer
12. Bulbs/lamps
13. Oxygen inlet.
14. Skin sensor

15. Drawers
16. Casters and lock
17. Drip stands
18. Side doors
19. Bacterial filter
20. Humidity gauge
21. Humidity measure/ manual hygrometer

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.
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.

6. Clean the incubator with soapy water, clean water and leave it to dry.

6-2: Routine care

1. Daily dump dusting of the incubator and leave it 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 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

2.21 HOT AIR OVEN

1: Definition

Hot Air Oven is 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)
3. Ventilators
4. Thermostat
5. Temperature Regulator
6. Temperature Gauges/Thermometer
7. Pilot Lamp/Indicating light
8. On and Off Switch
9. Cable with top-plug
10. Slotted equipment tray
11. Shelves
12. Sterilization chamber

4: 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

5: Operation

1. Load 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 time 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 sterile forceps

6: Sterilization temperature

1. Temperature range: 40°C-200°C
2. Glass slides 150⁰C-160⁰C – 15 minutes
3. Culture 160⁰C – 1 hour; 170⁰ C – 45 minutes; 180⁰ C – 30 minutes

7: Care

7-1: 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.

7-2: Routine care

1. Make sure that the Hot Air Oven is 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

8: Simple maintenance

1. Lubricate the door with silicon oil / WD 40 lubricant (only outer part don't use inside)
2. In case of failure, report to the immediate supervisor, user trainer, electrician or

technician.

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. Do not over heat specimen bottles they will break.
5. Do not place plastic or materials 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.

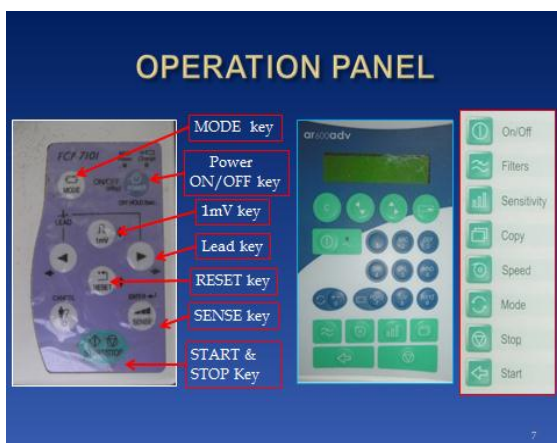
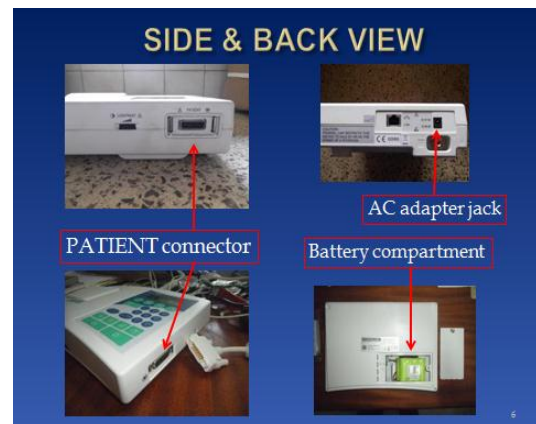
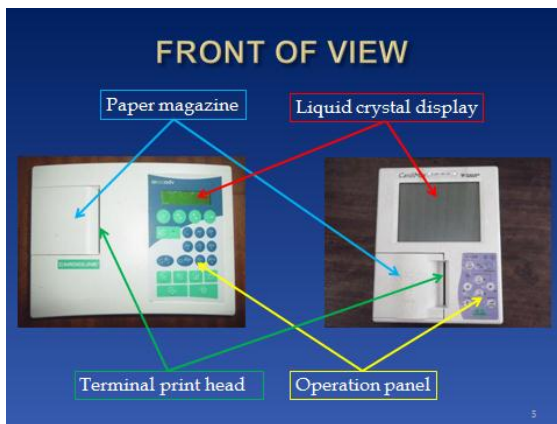
2.22 ELECTROCARDIAGRAM (ECG)

1: Definition

Electrocardiogram (ECG) is diagnostic tool that is routinely used to assess the electrical and muscular functions of the heart.

2: Parts

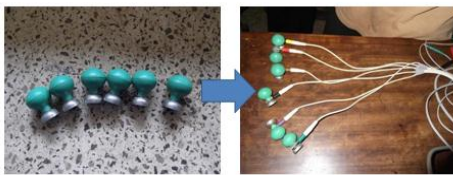
1. Body
2. Control panel
3. Screen/Monitor
4. Printer
5. Patient connector
6. Battery pack compartment



3: Accessories

1. Cable with Top plug
2. Power supply cord
3. Patient cable
4. Limb electrode
5. Chest electrode
6. Keratin cream (Paste)

Chest Electrode



Connect the Chest Electrode and Patient cable

Power supply cable



Patient cable



Limb Electrode



Connect the Limb Electrodes and Patient cables

Keratin cream (Paste)



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

COLORS TO NOTE
(IEC- International Electrotechnical Commission)

There is another type of color coding.

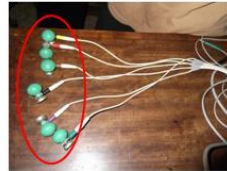
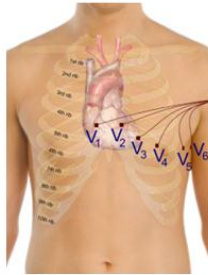
R	Right Arm	Red
L	Left Arm	Yellow
F	Left Leg	Green
N	Right Leg	Black

- 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

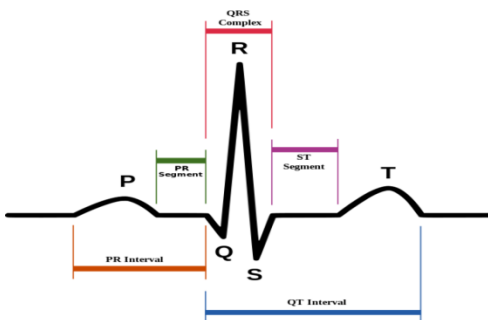
Chest Electrode

(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



4: Preparation

1. Switch on power. Make sure the initial screen is displayed.
2. Adjusting the display contrast.
3. Setting the Date and Clock.
4. Entering Patient's Data: -
 - ID(patient identification number)
 - Name
 - Sex (Male or Female)
 - Age

5: Operation

- 1 Make sure the machine is working well and is complete.
- 2 Load the ECG recording paper to the machine.
- 3 Explain the procedure to the patient.
- 4 Connect the accessories
- 5 Apply the keratin cream to the patient's skin aiming at the areas of intercostal spaces, e.g. V1 ~ V6
- 6 Attach the electrode to the keratin cream in right position.
- 7 The aim is to detect the abnormalities in the heart from all the areas.
- 8 Switch on power after all connection done.
- 9 If wrongly applied, it will indicate on the monitor.

6: Care

6-1: Immediate Care

1. Remove the Limb and Chest Electrodes from patient.
2. Switch off power
3. Clean up the patient.
4. Leave the patient comfortable
5. Unplug the top plug from the power source.

6-2: Routine care

1. Dump dust when used or when it is dirty.
2. Cover the machine to prevent dust with clean cloth.
3. Use a stabilizer to control current.
4. After using the machine, remove the cream from Limb and Chest electrode.
5. Check whether the recording paper is loaded properly.

2.23 FETAL DOPPLER

1: Definition

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

2: Model

BF-500D Pocket Fetal Doppler



JPD:100B Fetal Doppler



3: Parts of equipment

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

4: Preparation

1. Prepare the equipment
2. Prepare the mother for examination and make her comfortable.
3. Bring the equipment to the bed side.

5: 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. Fit batteries
4. Carry out examination using a probe
5. Record the findings

6: Care:

6-1: Immediate Care

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

6-2: 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.
4. Must be entered into the inventory book.
5. Must be entered into the hospital asset book.
6. Make sure it is complete.
7. Remove 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.

2.24 VERTICAL AUTOCLAVE

1: Definition

Vertical Autoclave is medical equipment used to sterilize instrument and sundries using steam under pressure and it is loaded from above.

2: Types

1. Electrical



3: Parts of equipment

1. Body
2. Lid with handle
3. Control panel
4. Chamber – Inner and outer
5. Wing nuts
6. Pressure gauge
7. Safety Gasket
8. Valve
9. Heating Element
10. Sensor
11. Water outlet
12. Water level mark
13. Funnel/glass tube

4: Accessories

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

5: Preparation

1. Check if the autoclave if it is in good working condition.
2. Clean the autoclave in and out.
3. Prepare instruments for sterilization.

6: Operation

1. Fill water into the autoclave
2. Pack the autoclave
3. Put on the sterilization tape.
4. Cover with lid and tighten the wing nuts.
5. Switch on the autoclave and record time the autoclave is switched on/if not automatic.
6. After the time is over switch off the autoclave and wait until the pressure gauge reaches 'O' mark.

7: Care

7-1: Immediate Care

1. Switch off the autoclave and wait for the pointer on the pressure gauge to reach zero mark.
2. Open the autoclave.
3. Remove the sterilized materials from the chamber.
4. Drain out the water and leave it to cool down.

7-2: Routine Care

1. Ensure equipment is entered in the hospital asset book.
2. Engrave the autoclave.
3. Report any fault to the immediate supervisor
4. Handover to the next health worker on duty.

Note:

Never leave an autoclave unattended to.

2.25 DIATHERMY

1: Definition

Diathermy is medical equipment used in operating theaters to carry out surgical operations by cutting and coagulation of blood vessels.



Accessories



2: Parts:

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

2-1: Accessories:

1. Cable from stabilizer to diathermy
2. Diathermy pencil and cable
3. Diathermy knife
4. Insulation plate
5. Cable with top plug
6. Foot switch
7. Stand and wheels
8. Stabilizer

3: Preparation

1. Make sure the machine is complete.
2. Ensure it is in good working condition
3. There should be proper earthing to avoid electric shock.

4: Operation

1. Connect the cable to the main power supply.
2. Connect the cable from stabilizer to diathermy machine.
3. Connect the diathermy pencil to the machine either monopolar or bipolar.
4. Connect the insulating plate to the machine.
5. Switch on power from the main power supply.
6. Switch on the stabilizer.
7. Switch on the power on the machine.
8. The machine is now ready for use.

5: Care

5-1: Immediate care

1. Switch off the power from the machine.
2. Switch off power from the stabilizer.
3. Switch off from the mains
4. Disconnect diathermy pencil and disinfect in Jik 0.5% for 10 minutes.
5. Disconnect insulating plate and clean.
6. 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 dusting when necessary.
3. Switch off when not in used and leave it covered.
4. Keep it in the zoned area.
5. Check for breakages, cracks and report any faulty to the immediate supervisor.
6. Hand over to the next health worker on duty.
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.

2.23 BLOOD GLUCOMETER

1: Definition

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

2: Types

2-1: Sure Step

2-2: Optimal

2-3: One touch step



Sure Step



Optimal



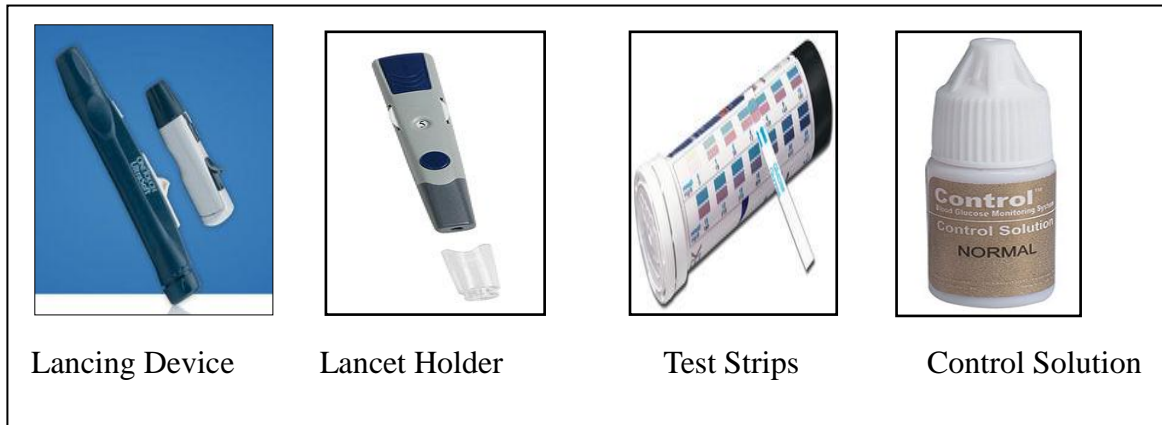
One touch step

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
6. Kidney dish
7. Hibitane solution
8. Glucometer bag



5: Preparation

1. Ensure that glucometer is in good working condition.
2. Check that the batteries are still working well.
3. Make sure the test strips are enough for the day's work.
4. Ensure that the Lancet and Lancet holder are in good working condition.
5. Make sure the code on the strip container matches with the machine.

6: Operation

1. Insert a new sterile lancet into the lancing device firmly until when it is in place and remove the protective cap from the lancet's end.
2. Adjust the lancing device to get the depth to puncture depending on the amount of blood required.
3. Use sterile swab to wipe off dirt from client's finger.
4. Hold the lancing device firmly against client's finger and press the release button ejecting the lancet device to allow it to puncture the finger tip for blood sample.
5. Squeeze the side of the fingertip gently to bring a drop of blood to the surface about 0.3 to 1 ul this depends on the model.
6. Wait until the meter displays the sign for inserting test strip.
7. Gently put the test strip into the machine port then wait for the meter to display the reading.
8. The time it takes to read the test strip may range from 3 to 60 seconds.
9. Read your blood glucose testing results as it is also store in the monitor.
10. Remove the test strip from the glucometer and switch off then discard the test strip.

7: Results

1. The results may be interpreted according to the set of the machine.
2. Example – In mmol or mgdl
3. 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 dump 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 dump 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.
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.

Note:

1. At the time of peripheral circulation imperfection and remarkable low blood pressure, hypothermia (because there is little bloodstream for the measurement position).
2. The measurement of an arrhythmic frequent patient.
3. The measurement of a patient using a heart lung machine.

2.27 PATIENT MONITOR

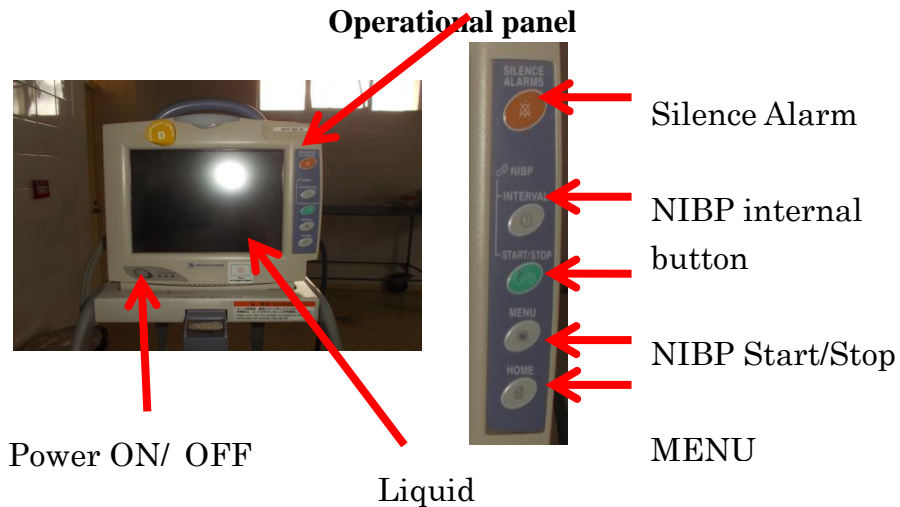
1: Definition:

A patient monitor is medical equipment used for monitoring vital signs i.e. Blood pressure Pulse, respiration and oxygen concentration in blood of a patient.

The vital signs monitored are: Blood pressure, Respiration rate, Temperature and oxygen concentration in the blood.

2: Types/Models

Front view:



Side View

RIGHT



LEFT



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

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 skin sensor

SPO2 Cable



NIBP Cable



ECG Cable



5: Preparation

1. Ensure that the equipment is clean and complete before use.
2. Connect the top cable from main to the Anesthetic machine.
3. Connect the cable from Anesthetic machine to the monitor.
4. Connect the ECG cable to the monitor.

5. Connect the pulse oximeter cable to the monitor.
6. Connect the Blood pressure machine to the monitor.
7. Connect the temperature sensor to the monitor
8. Make the patient comfortable
9. The ECG is connected to the patient
10. Pulse oximeter is connected to the patient's finger.
11. Connect the blood pressure to the patients arm.
12. Connect the temperature sensor to the patients' skin/arm pit.
13. Now you are ready for the operation.
14. Switch on the switch from the main, stabilizer.

6: Operation

1. Switch on from the mains
2. Switch on the stabilizer
3. Switch on the monitor
4. Observe and record the readings and monitor the vital signs.

7: Care

7-1: Immediate care

1. Switch off from the monitor.
2. Switch off from the anesthetic machine. Switch off the stabilizer, main and unplung
3. Remove all cables from patient and fold them well.
4. Switch off power
5. Leave the patient comfortable
6. Unplug the top plug from the power source.

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

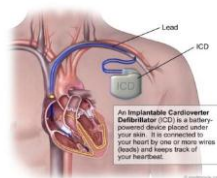
2.28 DEFIBRILLATOR

1: Definition

Defibrillator is medical equipment which is used to counteract fibrillation of the heart muscle and restore normal heartbeat by applying a brief electric shock. It can be used to treat defibrillation and tachycardia.

2: Types

Defibrillator
(Manual External Defibrillator)
 - It uses by Medical Staff in a
 hospital
ICD



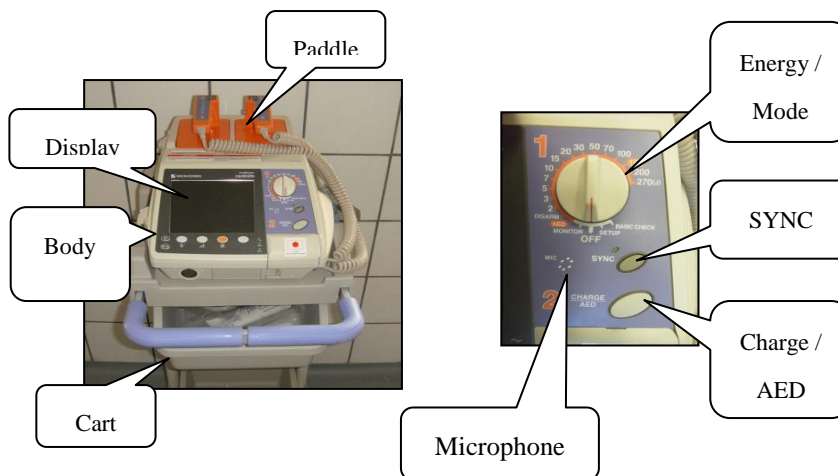
AED
(Automated External)



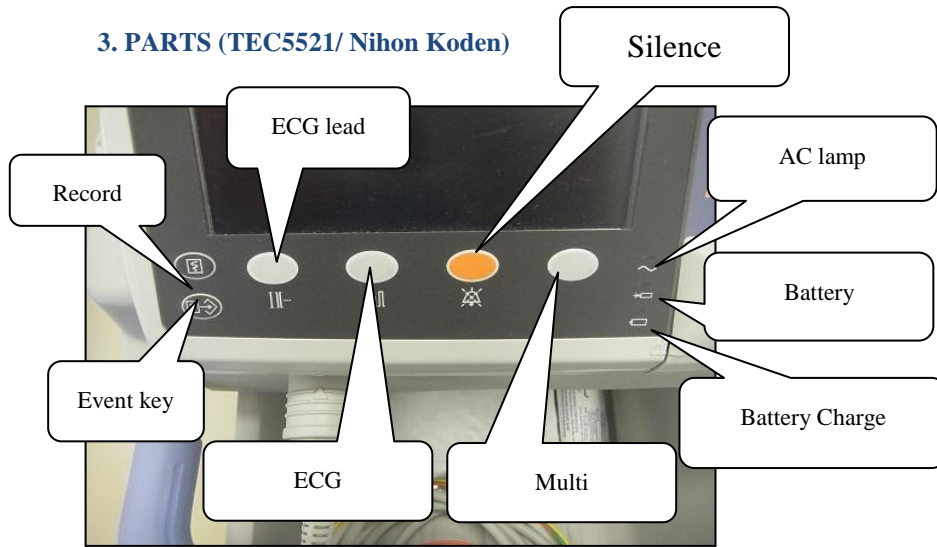
3: Parts

1. Main Body
2. An electrode or cab

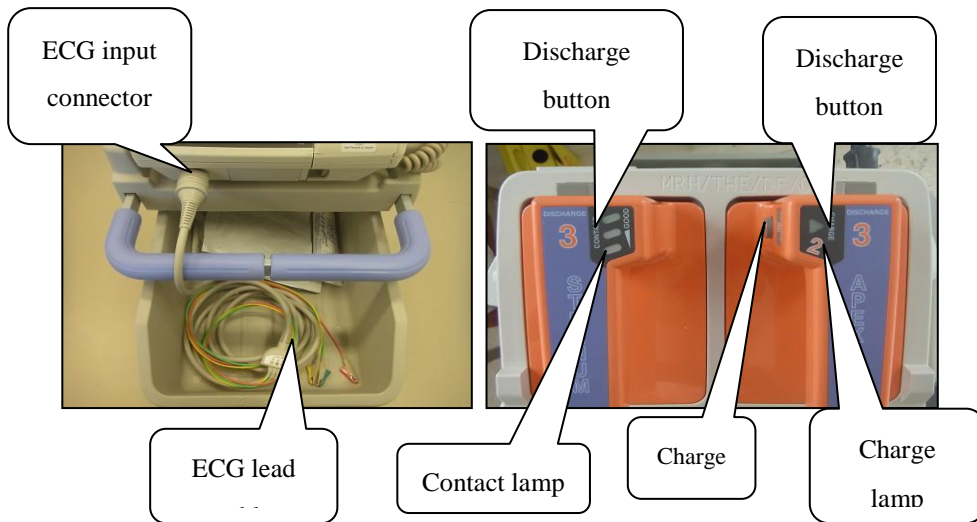
(TEC5521/ NihonKoden)



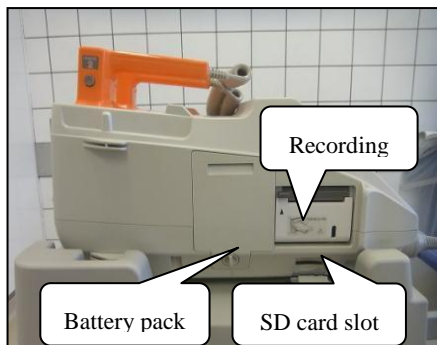
3. PARTS (TEC5521/ Nihon Kodan)



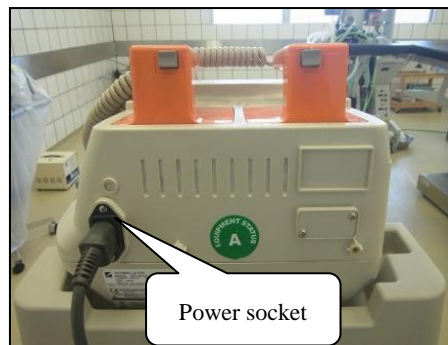
(TEC5521/ Nihon Kodan)



(TEC5521/ Nihon Kodan)



Left



Rear

4: Accessories



Gel



Recording
paper



Disposable electrode

5: FUNCTION

1. DEFIBRILLATION

Turn the power on the patient without electrocardiogram

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

2. SYNCHRONIZED CARDIOVERSION

- Synchronize with Cardiogram
- adaptation disease : **Atrial fibrillation (Af) , Atrial Flutter (AF) ,**
Ventricular Tachycardia (VT) ,
Paroxysmal Supraventricular Tachycardia (PSVT)

3. AED (option)

6: Preparation

1. This is an emergency so no wasting time.
2. Connect the cables and place the electrodes in the chest.

Get power supply from...

1. AC (socket)



e.g. when it is

OR

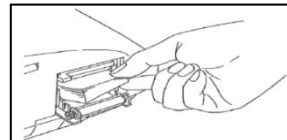
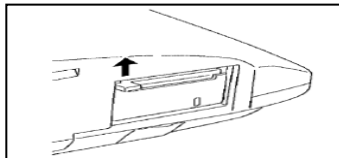
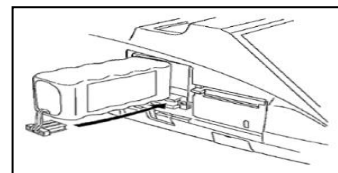
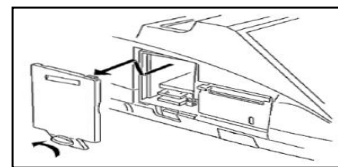
2. Charged Battery



The battery

How to install / replace the Battery

- A. Make sure that turn OFF the power.
- B. Disconnect the power cable.
- C. Turn the knob on the battery pack holder cover counterclockwise and remove the battery pack holder cover.
- D. Insert the battery into the battery pack



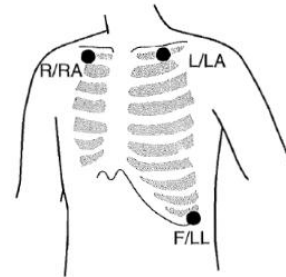
Recording Paper

- 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.

1. Check that the external paddles are connected to the defibrillator.
2. Turn the Energy/Mode select control to the “DISARM” position to confirm that there is no error message on the screen.

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

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



4. Press the ECG lead key to select the lead which has the highest QRS wave. Usually “II” is selected.

Defibrillation Non-synchronize

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

Cardio version Synchronize with ECG

6. 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.

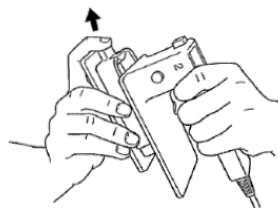
7. Prepare the paddles.

- 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.

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

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

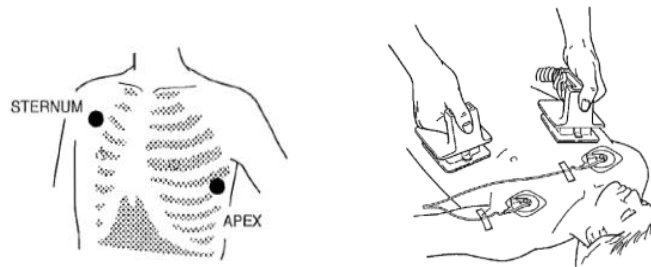
8. Turn the Energy/Mode Select control to the desired energy position



7: Operation:

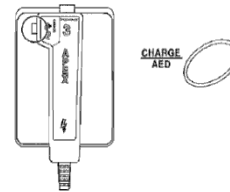
7-1: Place the paddles on the patient.

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



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

7-2: When the patient needs defibrillation, press the CHARGE button on the APEX paddle or CHARGE/AED button on the front panel to start



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

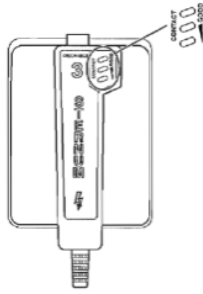
7-3: Check the skin-paddle contact impedance.

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

The CONTACT lamp on the STERNUM paddle indicates skin-paddle contact impedance.

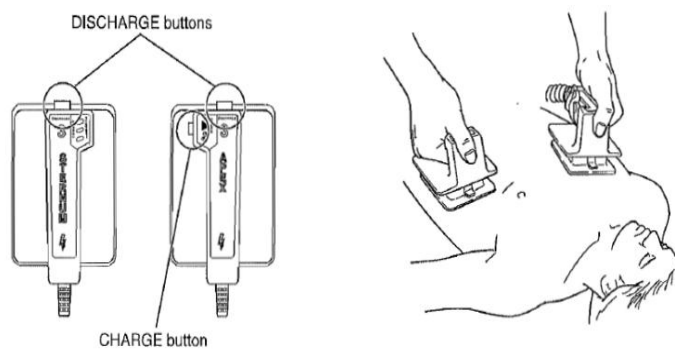
If the paddles so that the green lamp does not light, do the following.

- 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.



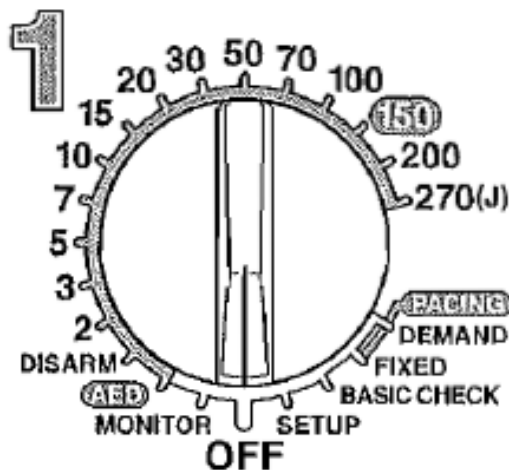
7-4: Discharge the energy to the patient.

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



8: Care

8-1: Immediate care:

1. Remove electrodes and wipe off the gel.
2. Return to designated area.
3. When you set to DISARM position, “0J” is displayed on the screen.
4. Disconnect the power cable and switch OFF from machine, stabilizer & mains.
5. Wipe paddles and paddle folders.
6. Keep the machine in its zoned



8-2: Routine care:

1. Check the defibrillator if it is not dirty or damaged.
2. Paddles should be cleaned when dirty.
3. Lock wheels when you not in use.
4. Keep it in a safe place and covered.
5. The Energy/Mode Select control supposed to be OFF when not in use.
6. Accessories are kept neatly.
7. The maintenance should be done by a qualified technician periodically.
8. Keep the machine in its zoned place.

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 any charged energy remains in the defibrillator.
3. Before defibrillation, all persons must keep clear of the bed and must not touch the patient or any equipment or

2.29 ULTRASOUND

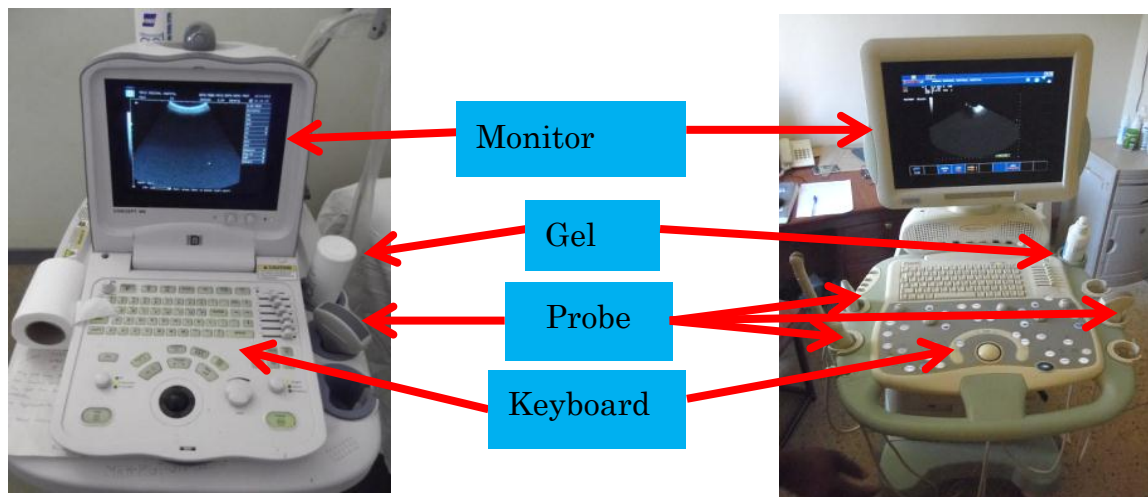
1: Definition

Ultrasound is a Medical Equipment which uses high waves to examine internal org and visualize muscles and tendons, capture their size, structure and any pathological lesions.

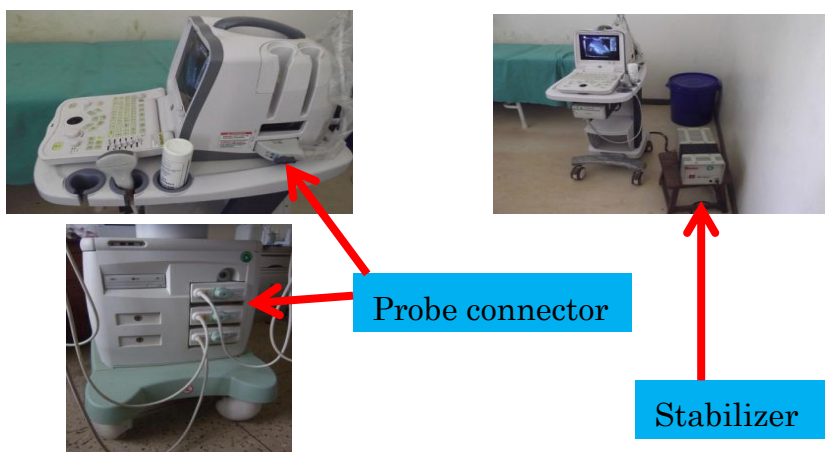
2: Types/Models

- 2-1: Echocardiogram
- 2-2: Obstetric Ultra sound
- 2-3: Carotid Ultra sound

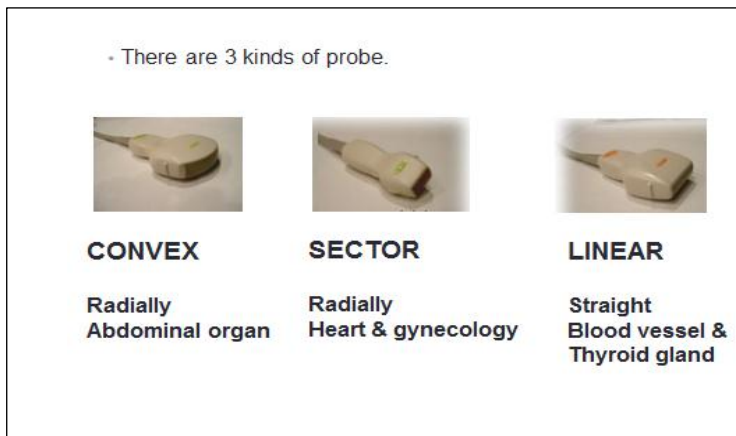
FRONT VIEW



SIDE and OUTWARD View



Probes:



Ultrasound Gel



3: Parts

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

4: Accessories

1. Stabilizer
2. Cable and Top plug
3. Gel or Cream
4. Printer
5. Electrodes

5: Preparation

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

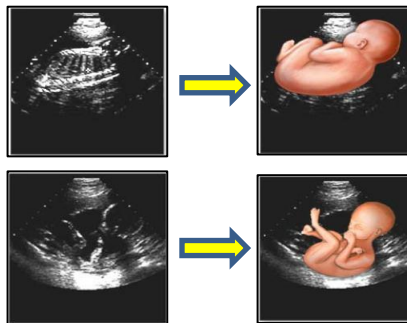
6: Operation

1. Switch on power
2. Attach electrodes according to instructions
3. Use the proper probe to scan.
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



Operation in case of emergency:

1. Cancel the measurement in case of a blackout, remove plug
2. In case of suspicious electrode damage (where no pulse being recorded at all)
3. Check the connection of the electrodes or internal wire breakage
4. Electrodes should be changed when damaged

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.
4. Make the patient comfortable.
5. Unplug the top plug from the power source
6. Avoid twisting the electrode

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 clean cloth.
4. Use a stabilizer to control current.
5. After using the machine, remove the cream from probe.
6. Keep in a safe place
7. Check for any crack in the probe connectors and rubber tubing.
8. The machine is to be serviced after every six months.
9. Must be entered in the inventory and hospital asset books
10. In case of failure:
11. Report to immediate supervisor in charge.
12. To the User Trainer
13. To the qualified Medical Technician for repair.

2.30 Use full table

List of blood numerical value

Inspection item	Standard range	Unit	The disease that is worried about
Blood test			
Hemoglobin (Hb)	Male.13-17 Female.11-16	g/dl	Anemia
Hematocrit (Ht)	Male.40-52 Female.34-46	%	
Red blood cell (RBC)	Male.4200000-5500 0000 Female. 3500000- 5000000	mm ³	
White blood cell (WBC)	Male.3900-9700 Female. 3500-9100	mm ³	Infectious disease Bleeding Leukemia
Platelet (Plt)	1200000-3400000	mm ³	
Sedimentation of blood	20 ↓	mm/h	Inflammatory disease Anemia
Serum iron (Fe)	Male 54-200 Female.48-154	μg/dl	Sideropenic anemia Hepatitis
Examination of liver, pancreas function			
Total protein (TP)	6.5-8.3	g/dl	Aggravation of the nourishment state, Renal disease, Liver disease
Total bilirubin (T-Bil)	0.2-1.0	mg/dl	Jaundice, Obstacle of biliary tract origin
Zinc sulfate muddiness examination ZTT	4-12	U	Collagenosis, Chronic liver disease, Myeloid disease
GOT	10-40	IU/l	Heart, and Liver disorder
GPT	5-40	IU/l	Liver disorder
LHD	112-220	IU/l	Hepatitis, Myocardial infarction, Malignant tumor acute hepatitis, Chronic hepatitis, Fatty liver, Cirrhosis

γ-GTP	Male. 70↓ Female. 30↓		
I inspect a disorder of liver and gall way origin			
Serum amylase (AMY)	60-180	IU/dl	Pancreas disorder Salivary gland disorder
Kidney			
Urea nitrogen (BUN)	8-20	mg/dl	Renal function, Renal insufficiency
Creatinine (Cr)	0.5-1.2	mg/dl	
The ventilation			
Uric acid (UA)	Male. 3.7-7.6 Female. 2.5-5.4	mg/dl	The ventilation
Serum, fat			
Total cholesterol (T-cho)	120-220	mg/dl	Arteriosclerosis, Obesity
Acyl glycerol (TG)	50-150	mg/dl	Arteriosclerosis, Diabetes Fatty liver
HDL cholesterol	Male. 40-85 Female. 45-95	mg/dl	Arteriosclerosis
LDL cholesterol	65-140	mg/dl	Arteriosclerosis
Hepatitis			
HBS antigen	(-)		Hepatitis B
HCV antibody	(-)		Hepatitis C
Diabetes			
Fasting blood sugar (BS)	70-110	mg/dl	
Hemoglobin A1c (HbA1c)	4.2-5.8	%	Diabetes
Examination for electrolyte, mineral matter			
Potassium (K)	3.7-5.0	mEq/l	Hyperkalemia Hypokalemia
Sodium (Na)	137-149	mEq/l	Hypernatremia Hyponatremia
Calcium (Ca)	8.4-10.2	mg/dl	Hypercalcemia Hypocalcemia

The crawl (Cl)	100-110	mEq/l	Hyperchloremia Low crawl blood symptom
Magnesium (Mg)	1.3-1.9	mEq/l	Kidney disease Thyroidal functional disorder
Blood oxygen density			
Oxygen saturation · (SPO2)	96-100	%	Pneumonia, Respiratory illness Heart trouble

3. 5S ACTIVITY

3.1 What is 5S?

5S is a management tool, which originated from the Japanese manufacturing sector. It is used as a basic, fundamental, systematic approach for productivity, quality and safety improvement in all types of organizations.

5S is literally five abbreviations of Japanese terms with five initials of S. There are *Seiri*, *Seiton*, *Seiso*, *Seiketsu* and *Shitsuke*. In English, 5Ss were translated as *Sort*, *Set*, *Shine*, *Standardize* and *Sustain*. These are explained briefly below:

1. <u>S</u> ort	Remove unused stuff from your venue of work and reduce clutter
2. <u>S</u> et	Organize everything needed in proper order for easy operation
3. <u>S</u> hine	Maintain high standard of cleanness
4. <u>S</u> tandardize	Set up the above three Ss as norms in every section of your place by use of Standard Operating Procedures and checklists
5. <u>S</u> ustain	Train and maintain discipline of the personnel engaged

The five steps of Sort-Set-Shine-Standardize-Sustain are a sequence of activities to improve the work environment to be as convenient and comfortable as possible and thereby also improve service contents with respect to preparedness, standardization and timeliness.

3.2 5S in Uganda

The implementation of 5S in Uganda started in 2007 at Tororo General Hospital as the pilot hospital in collaboration with JICA, Japan. By March 2011, 5S had been scaled to include a number of hospitals in Uganda (Bududa, Busolwe, Entebbe, Gombe, Kapchworwa, Masafu and Mbale) and selected Health Center IVs in Tororo district. By the middle of 2013, 5S had been expanded to many hospitals (Arua, Lira, Gulu, Soroti, Hoima, Masaka and Kabale), some Department of the MOH headquarter and all of the Medical Equipment Maintenance Workshops.

According to the monitoring and evaluation, the 5S approach was verified as a practical, cost effective and efficient intervention for the improvement of the work environment that supports the effective implementation of other Quality Improvement (QI) interventions. Therefore, MoH adopted 5S concept as one of the QI interventions to be included in the National Quality Improvement Framework and Strategic Plan 2010/11 – 2014/15.

3.3 Practical hints for five steps

The basic actions and practical hint for implementing 5S are shown in the following section. The principal example and practical hints are shown for every step of 5S.

1S: SORTING / Elimination

Basic actions for sorting

1. Create a chaos free environment.
2. Clean the walls and notice boards.
3. Use “Red Tags.”

How?

- Dispose off unnecessary materials on tables, in drawers, in cabinets and on the floor.
- Remove unnecessary instructions and posters on the walls and on notice boards.
- Attach Red Tags for undecided items for disposal and determine whether the item “may be necessary” or is “unnecessary.”

Hints for actions

- Eliminate all unnecessary items from workplace and reduce clutter.
- Go through all tools, materials, and so forth in the work area.
- Keep only essential items and eliminate what is not required, prioritizing things as per requirements and keeping them in easily-accessible places.
- Everything else should be stored or discarded.

		
<p>Dispose off unnecessary materials on tables, in drawers, in cabinets and on the floor.</p>	<p>The walls and notice boards use X-Y line.</p>	<p>Attach “Red Tags” for undecided items for disposal and determine whether the item “may be necessary” or is “unnecessary.”</p>
		
<p>Good example of chaos free environment at the office desk.</p>	<p>The walls and notice boards use X-Y line.</p>	<p>Remove unnecessary instructions and posters on the wall and on the notice boards.</p>

2S: SETTING/Material Handling

Basic points for setting material handling



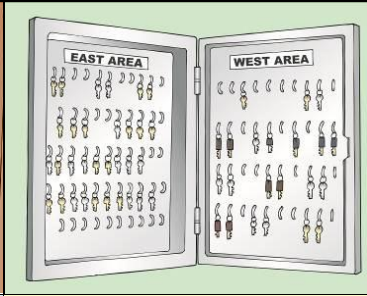



1. Zone/area, clear transport routes;
2. Multi-level shelves and containers;
3. Home for each tool;

How?

- Secure transport routes without obstacles that are even and not slippery.
- Provide multi-level shelves or storage racks near the work area for medical charts and drugs.
- Provide a “home” for medical equipment and work items and mark their position clearly.
- Use carts, hand-trucks and other wheeled devices when moving materials.

Hints for actions

- Organize everything needed in proper order for ease of operation.
- There should be a place for everything and everything should be in its place.
- The place for each item should be clearly labeled or demarcated.
- Items should be arranged in a manner that promotes efficient work flow, with equipment used most often being the most easily accessible.

		
<p>Clear transport routes with clear mark.</p>	<p>Provide multi-level shelves or storage racks near the work area for medical drugs.</p>	<p>Provide a “home” for each piece of medical equipment.</p>
		
<p>Use carts, hand-trucks and other wheeled devices when moving materials.</p>	<p>Secure transport routes without obstacles that are even and not slippery.</p>	<p>Provide multi-level shelves for medical charts in the record unit.</p>

2S: SETTING/ Workstation changes

Basic points for setting workstation changes

1. Easy reach

2. Elbow height

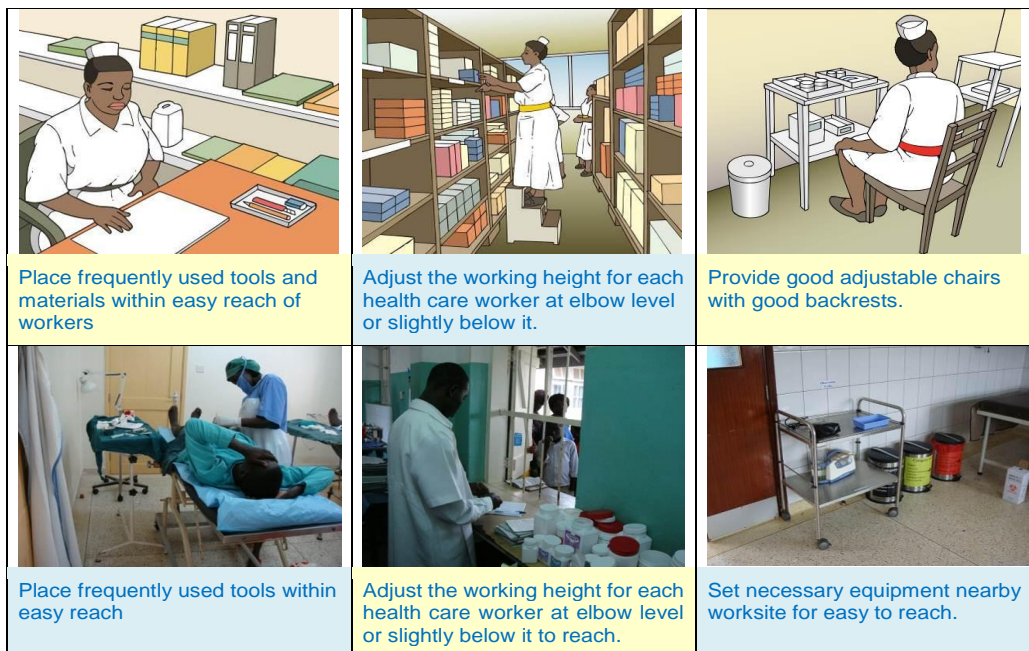
3. Comfortable chairs

How?

- Place frequently used tools, controls and materials within easy reach of workers.
- Adjust the working height for each health care worker at elbow level or slightly below it.
- Allow workers to alternate standing and sitting as much as possible and provide good adjustable chairs with good backrests.

Hints for actions

- Items should be arranged in a manner that promotes efficient work flow, with equipment used most often being the most easily accessible.
- Workers should not have to bend repeatedly to access materials.
- Each tool, part, supply, or piece of equipment should be kept close to where it will be used – in other words, straightening the flow path.



2S: SETTING/ Labels, signs, color coding

Basic points for setting labels, signs, color coding

- | | |
|------------------------|----------------------------------|
| 1. Labeling | 3. Color coding/numbering |
| 2. Safety signs | 4. Signboards/mapping |

How?

- Make labels, colors and signs easy to see, easy to read and easy to understand.
- Provide clear instructions and information necessary for safe, efficient work.
- Use color coding rules such as for garbage, medical waste and linen by type.
- Use a board with X-Y axis alignment for sharing medical information, a 5-S corner display and a map of work areas for patients.

Hints for actions

- The place for each item should be clearly labeled or demarcated.
- Items should be arranged in a manner that promotes efficient work flow, with equipment used most often being the most easily accessible.

<p>Labels should be easy to read and easy to understand.</p>	<p>Clear instructions for operation of the fire extinguisher.</p>	<p>Numbering rules of medical charts for proper setting,</p>
<p>5S corner display by X-Y axis alignment.</p>	<p>The place for each item should be clearly labeled or demarcated.</p>	<p>A map of work areas for patients.</p>

3S: SHINING/ Regular maintenance and cleanliness

Basic points for Shining

- 1. Cleanliness
- 2. Waste bin, cleaning tool
- 3. Proper maintenance of equipment

How?

- Designate the responsibility for keeping areas clean to staff members and clean regularly.
- Place waste bins and cleaning tools in the appropriate workplace.
- Inspect and maintain medical Instruments, machines and tools regularly.

Hints for actions

- Discuss the placement of waste bins in areas where they are needed at your workplace.
- Regular maintenance keeps your medical equipment productive and safe. Check all machine parts carefully. In particular, special care is needed for rotating parts, detachable guards and electrical wires, etc.
- If you find an inexpensive machine, you should check its safety aspects even more carefully. When accidents occur, costs can be enormous.
- Develop a long-term maintenance plan. For instance, you may check the machine thoroughly every weekend.

		
<p>Designate responsibility for keeping the area clean to staff members.</p>	<p>Place waste bins and cleaning tools in the appropriate workplace location.</p>	<p>Inspect and maintain medical instruments, machines and tools regularly.</p>
		
<p>Cleaning regularly supports daily work tasks.</p>	<p>Place waste bins at every point where HWs undertake procedures.</p>	<p>Discuss establishing a standard of cleanliness with staff members.</p>

4S: STANDARDIZE/Improving quality of care

Basic points for standardizing

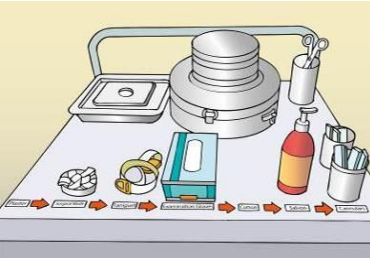




1. Standardized care procedures
2. Procedures of the equipment
3. Ensuring patients' privacy
4. Establishing hand hygiene
5. Reducing patients' waiting time

How?

- Establish the protocols of standardized care procedures about each cure and care, such as maternity, vaccination, medical health checkup.
- Display procedures of the equipment and label clearly what operation is meant.
- Use partitions, curtains and other arrangement for protection privacy of persons cared
- Establish hand hygiene procedures and hygienic washing facilities.
- Reducing waiting time for patients at an outpatient room, a laboratory and a pharmacy.

Hints for actions

- Listing basic clinical procedures makes it easy to find necessary standardized care procedures for documentation.
- Labels and signs are needed for clear instruction for procedures.
- Encouraging collection of patients' opinion is essential for improving quality of care.
-

<p>STEPS FOR MALARIA DIAGNOSIS</p> <pre> graph TD A[Malaria Suspected] --> B[Malaria Smear Positive] A --> C[Malaria Smear Negative] B --> D[Non Falciparm] B --> E[Falciparm Species] D --> F[Yes] D --> G[NO] E --> H[*****] C --> I[*****] </pre>		
<p>The protocols of standardized malaria diagnosis as a flowchart</p>	<p>Instructions for procedures for the use of equipment with operations clearly labeled.</p>	<p>Curtains for protection privacy of persons cared.</p>
		
<p>Proper hand hygiene procedures and hygienic washing facilities.</p>	<p>A suggestion box helps improve the quality of care.</p>	<p>Reducing waiting times for patients at outpatient departments, laboratories and pharmacies.</p>

5S: SUSTAIN/Teamwork

Basic points for sustaining

1. Tool box meeting 3. Work Improvement Team (WIT), 5S Training

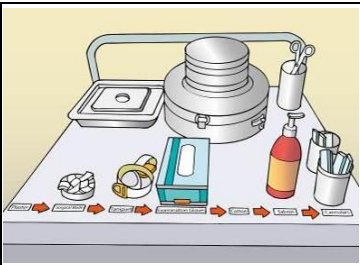
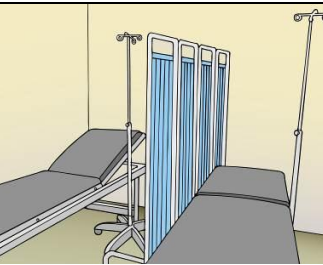



2. Record of accidents and injuries

How?

- Hold a brief meeting before beginning work to plan assignments and avoid giving excessive workloads to particular staff members.
- Keep records of medical accidents, occupational injuries and diseases for ensuring both patients and workers' safety.
- Encourage Work Improvement Team (WIT) activities and provide adequate participatory 5S and safety/health improvement training to all workers.

Hints for actions

- Record all accidents, absences, sickness, and other health-related events.
- Plan annual work schedules including sufficient training periods.

<p>STEPS FOR MALARIA DIAGNOSIS</p> <pre> graph TD A[Malaria Suspected] --> B[Malaria Smear Positive] A --> C[Malaria Smear Negative] B --> D[Non Falciparm] B --> E[Falciparm Species] D --> F[Yes] D --> G[NO] E --> H[.....] F --> I[.....] G --> J[.....] H --> K[.....] </pre>		
<p>The protocols of standardized malaria diagnosis as a flowchart</p>	<p>Instructions for procedures for the use of equipment with operations clearly labeled.</p>	<p>Curtains for protection privacy of persons cared.</p>
		
<p>Proper hand hygiene procedures and hygienic washing facilities.</p>	<p>A suggestion box helps improve the quality of care.</p>	<p>Reducing waiting times for patients at outpatient departments, laboratories and pharmacies.</p>

4. SUPPORT SUPERVISION AND MONITORING

4.1 POLICY

The User Trainers are to carry out User Training activities in their areas of operation. After organizing and conducting training for the equipment Users, there is always need to follow-up the equipment Users to assess the impact of the training.

4.2 FREQUENCY

Ideally the Support Supervision should be done quarterly.

4.3 MONITORING SHEET

CHECK LIST FOR ASSESSING EQUIPMENT USERS

CHECK LIST FOR ASSESSING EQUIPMENT USERS				Date:2013											
Name of Hospital:										Score					
Name of Equipment User:										Excellent (5),					
Name of Equipment:										Very Good (4),					
No.1	<i>EG. Infant Incubator</i>									Good (3)					
No.2	<i>EG. Infant Warmer</i>									Fair (2),					
										Poor (1)					
Check Item (Check Point)			Scores										Comment		
			5		4		3		2		1				
			1	2	1	2	1	2	1	2	1	2			
1	Workplace	A	Cleanliness												
		B	Arrangement												
2	Knowledge about the Medical Equipment.	A	Identification of Equipment												
		B	Name each part of equipment												
		C	Function of each part												
		D	Check before operation.												
		F	Care after use.												
		G	Easy maintenance.												
		H	Asking and Answering questions												
3	Practical skill, Demonstration	A	Necessary check before operation												
		B	The function of each part.												
		C	Operation method of each part.												
		D	Care after use.												
		E	Easy maintenance.												
		F	Asking and Answering Questions												
4	Attitude	A	Positive												
		B	Negative												
5	Total Score	A	Each score		0	0		0	0	0		0			
		B	Score		0			0	0	0		0			
Assessed by										COMMENTS					
Title															
Signed															

Supported by

