

COMMON EQUIPMENTS & TROUBLE SHOOTING

The module is designed to complement pre-service and in-service education of nursing personnel involved in care of newborns.

LEARNING OBJECTIVES

The participants will be able to :

- **Use and maintain the neonatal equipments: Incubator, radiant warmer, phototherapy machine, resuscitation bag, weighing machine, suction machine, oxygen concentrator, pulse oximeter, infusion pump, glucometer**
- **Learn trouble shooting, keeping them clean and routine maintenance**

MODULE CONTENTS

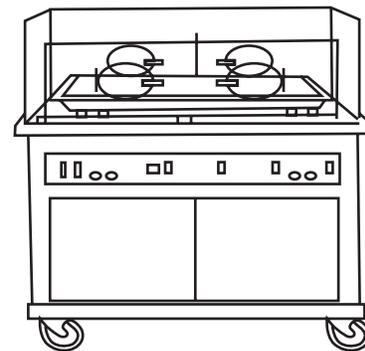
The module includes the following elements:

- **Text material:** Easy to read format for quick reproduction and essential reference material for the participants. Key messages are highlighted in the boxes.
- **Demonstration:** Observing the functioning and maintenance in the hospital setting.
- **Self-evaluation:** At the end of text, self evaluation based on what has been learnt is included. Feel free to consult your text material, if you need assistance in recapitulating.

I. INCUBATOR

Parts

- Canopy with port holes (baby tray for placing the neonate).
- Heat source with fan underneath the baby tray
- Skin probe (for sensing the baby's skin temperature).
- Air probe
- Control Panel(displays and control knob)
 - Mode selector(selects air or skin mode)
 - Heater output display.
 - Temperature selection key/knob (select the desired skin temperature).
 - Temperature display (displays the temperature of baby's skin, the set temperature and air temperature).
 - Alarm display for power failure, system failure, skin probe failure, set skin temperature (above & below set temperature) and air flow.
- Determine the appropriate temperature for the incubator based on the baby's weight and age (Table below)
- Warm the incubator to the desired temperature before placing the baby inside



Recommended incubator temperature for Air Mode

Weight of baby	Incubator Temperature by Age*			
	35°C	34°C	33°C	32°C
Less than 1.5 kg	1 to 10 days old	11 days to 3 wks old	3 to 5 wks old	More than 5 wks old
1.5 to 2.0 kg		1 to 10 days old	11 days to 4 wks old	More than 4 wks old
2.1 to 2.5 kg		1 to 2 days old	3 days to 3 wks old	More than 3 wks old
More than 2.5 kg			1 to 2 days old	More than 2 days old

- ⊗ Clean the mattress and cover it with a clean sheet
- Ensure that the incubator's water reservoir is empty; dangerous bacteria may grow in the water and infect the baby. Leaving the reservoir dry will not affect the function of the incubator
 - Ensure that the baby's head is covered with a cap, feet secured with socks and the diaper on
 - Place only one baby in each incubator. If baby is in supine position, place the skin probe on the right hypochondrium. When in prone position, place the probe on the loin area
 - Close the hood as quickly as possible after placing the baby inside and keep the portholes of the incubator closed at all times to keep the incubator warm make sure to place the incubator away from the walls
 - Work in air mode, if baby is unstable and skin mode/servo mode if baby is stable. If the incubator is in skin/servo mode the set temperature should be between 36.5°C to 37.5°C. Smaller the baby, higher is the set temperature
 - Check the temperature of the **incubator** every hour for the first eight hours, and then every three hours:
 - If the temperature of the incubator does not match the set temperature, the incubator may not be functioning properly; adjust the temperature setting until the desired temperature is reached inside the incubator or use another method to warm the baby
 - Measure the **baby's** temperature every hour for the first eight hours, and then every three hours:
 - If the baby's temperature is less than 36.5°C or more than 37.5°C, adjust the temperature of the incubator accordingly;
 - If the baby's temperature remains less than 36.5°C or more than 37.5°C inspite of the incubator being kept at the recommended setting, suspect infection
 - Move the baby to the mother as soon as the baby no longer requires special care, frequent procedures and or treatment. For a stable baby, if the heater output is less than 25% on skin/servo mode or in air mode at 28°C to 30°C and the baby is maintaining the skin temperature, it is time for shifting the baby to the mother
 - Place the incubator in a place where there is no direct sunlight OR Place the incubator shielded from direct sunlight
 - Always position the incubator in such a way that free air enters the air inlet
 - When the equipment is in use, all approachable internal and external surfaces should be cleaned daily with soap and water. Spirit or other organic solvents must NOT be used to clean the incubator hood or panel
 - Every seventh day, after shifting the baby to another clean incubator, the used equipment

should be cleaned thoroughly, first by light detergent solution and then by antiseptic solution. All detachable assemblies, especially from the under deck area, are to be treated similarly. After drying, the parts are reassembled and sterilized using a vaporizing agent and/or fumigation. Adding 30 ml of 2 % glutaraldehyde and 90 ml of distilled water in humidity tank and plugging it for 4 hours leads to fumigation of the incubator. Plug in for half an hour and keep closed for four hours. After this clean incubator thoroughly. After fumigation it should be thoroughly aired. The sleeves of the access windows must preferably be changed daily and cleaned. Check and dust the air filter every day

- Maintenance checklist
 - Date of change of air-filters : every 3 months
 - Date of temperature calibration : every 3 months
 - Date of preventive check : every 6 months

ALARMS ON THE INCUBATOR:

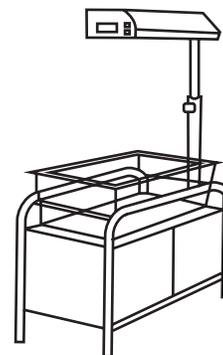
Whenever alarm is ON try to identify the reason and take corrective action. Silencing the alarm without understanding may harm the baby.

Alarm	Problem	Response
"Power alarm"	This alarms if the mains power fails.	Find alternative means for heating if power cannot be fixed e.g. (KMC).
"System alarm"	This alarms if there is an error in the electrical circuit. There will be "Error codes" (EEE) on the display.	Change incubator as the incubator needs repair.
"Over temperature alarm"	This signals that the temperature inside the incubator is too high. The heater power will be automatically disconnected. It sounds when the air temperature is > 38°C in manual mode or when the air temperature is > 39°C in servo mode.	Check "set" temperature settings and adjust down if set too high. If set temperature appropriate then change incubator as it needs repair
"Air flow alarm"	This alarm sounds if the air circulation in the incubator fails.	Change the air filter as per the recommendation or look if the fan is moving. If problem persists, the incubator should be changed; this is a maintenance issue.
"Sensor alarm"	This alarm sounds if the air sensor is not connected properly or if it is not functioning properly.	Try to re-connect the sensor correctly. If this does not work, it requires changing.
"Skin temperature alarm"	This alarm operates in servo mode only. It sounds when the patient temperature differs from the SET temperature by > 1°C in skin mode and 3°C in air mode	Change to manual mode and adjust the temperature to try and normalize the baby's temperature. Check for signs of infection.
"Set temperature alarm"	This alarm operates in manual mode only. It alarms if the set temperature is >1.5°C above or < by 3°C below the air temperature once the incubator has had sufficient time to heat after turning on.	The incubator needs repair.

II. RADIANT WARMER

Parts

- Bassinet (for placing the neonate).
- Radiant heat source
- Skin probe (for sensing the baby's skin temperature).
- Air probe
- Control Panel (displays and control knob)
 - Mode selector (selects manual or servo mode)
 - Heater output control key/ knob to increase or decrease the heater output manually.
 - Heater output display.
 - Temperature selection key/knob (select the desired skin temperature.
 - Temperature display (displays the temperature of baby's skin, the set temperature and air temperature).
 - Alarm display for power failure, system failure, skin probe failure, skin temperature high/low and heater failure.
- Ensure that the temperature of the room is $\geq 22^{\circ}\text{C}$ for optimal functioning
- Place the warmer away from air currents
- Clean the mattress and platform, and cover the mattress with clean sheet
- Turn on warmer for at least 20 minutes to pre-warm the linen and mattress
- Read temperature on display. Adjust heater output to
 - High : If baby temperature is below 36°C
 - Medium : If baby temperature is between 36°C - 36.5°C and to
 - Low : If baby temperature is between 36.5°C - 37.5°C
- Once the baby's temperature is between 36.5 - 37.5°C , switch on to servo skin mode
- If baby is in supine position place the skin probe on the right hypochondrium. When in prone position, place the probe on the loin area. To prevent skin injury, place tegaderm and fix the probe on it with an adhesive
- Ensure that the baby's head is covered with cap and feet secured in socks and keep the diaper on
- If the baby is < 1000 grams use cling wrap across the panels to prevent insensible water loss
- Place only one baby under each radiant warmer
- Keep the baby dry, change soiled or wet napkins or diapers and baby sheets
- Turn the baby frequently while under the warmer, if possible
- Check the temperature of the warmer the room every hour and adjust the temperature setting accordingly. Record the heater output in each shift (every 6 hours). Any sudden increase in heater output is an early indicator of sickness



- Shift with mother as soon as the baby no longer requires frequent procedures and treatment. If the heater output is <20% in servo mode, it is safe to shift the baby to mother's side

Servo Mode

- Set temperature at 36.5°C, heater output will adjust automatically to keep baby at set temperature. If baby temperature is below the set temperature, the heater output will increase; if baby is at set temperature or higher the heater output will become zero
- Look for probe displacement when the baby is in servo mode. Check for and ensure proper probe placement every hour

Manual Mode

- Once connected to mains, heater output can be regulated by knob on front panel. The output is displayed as % or bars or bulbs
- Use maximum (100%) output for rapid warming of bassinet in labor room 20 minutes before delivery. Reduce output to 25-75% after 10 minutes depending on ambient temperature. If left on with heater output >80%; alarm is activated within 15 or 20 minutes and there after the heater output goes to 40%; if alarm is silenced the heater output will be kept on maximum for another 15 to 20 minutes as per manufacturers recommendation
- For low birth weight or sick neonate adjust heater output depending on baby's temperature.
- Never use full (100%) heater output unsupervised
- Record baby's temperature every 2-4 hourly
- Use manual mode only for pre-warming, during resuscitation and initial stabilization

For disinfection

- For daily cleaning of front panel use damp cloth soaked in mild detergent (soap water)
- Don't use spirit or other chemicals
- Bassinet, cot should be disinfected daily using soap/detergent solution or disinfectant solution

ALARMS ON THE SERVO RADIANT WARMER (NO ALARMS IN MANUAL MODE)

Alarm	Problem	Response
"Power alarm":	This alarms if the mains power fails.	Find alternative means for heating if power cannot be fixed e.g. (KMC). Check the fuse.
"System alarm":	This alarms if there is an error in the electrical/ electronic circuit	Change WARMER, as it needs repair.
"Skin Probe failure alarm":	This alarm sounds if the temperature probe sensor is not connected properly or if it is not functioning properly.	Try to re-connect the sensor correctly. If this does not work, change it.

"Skin temperature alarm High or Low ":	This alarm operates in servo mode only. It sounds when the patient temperature differs from the SET temperature by > 0.5°C.	Change to manual mode with maximum output if baby is having low temperature and adjust the temperature to try and normalize the baby's temperature. If baby is having fever, shift to manual mode and set appropriate heater output. Check for signs of infection.
Heater Failure	Indicates heater is not working	Change warmer, needs repair.

III. PHOTOTHERAPY UNIT

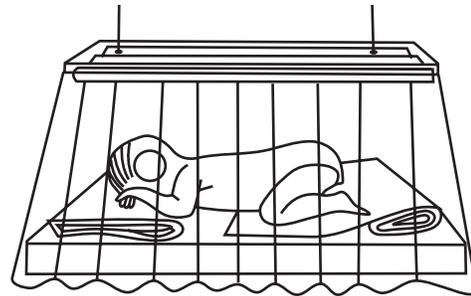
Parts of phototherapy machine:

Source of light

- Flourescent lights (conventional phototherapy)
- Compact flourescent lights(CFL)
- Light emitting diodes(LED)

Other parts

- Fan
- Light meter



Tips towards delivering safe and effective phototherapy

- Protect the eyes from light using eye patches once the lights are on
- Keep baby naked with a small nappy to cover the genitalia
- Place the baby as close to the lights as the manufacturers' instructions allow. Use white curtains or linen as slings so as to reflect back as much light as possible to the baby, making sure not to cover top surface of unit which allows air flow for cooling the bulbs.
- Encourage frequent breast feeding. No need to supplement breastfeeding with any other type of feed or fluids
- Temporary interruptions for feeding or procedures are allowed. But not for oro-gastric feeding or for IV fluids
- If baby is on IV fluids or expressed breast milk increase the volume by 10%.
- Monitor for and ensure urinary frequency 6-8 times /day.
- Monitor temperature 4 hourly and weight every 24 hours.
- Estimate serum bilirubin frequently ~ q12 hourly. Clinical or visual assessment of jaundice under lights becomes fallacious.
- Change tube lights every 6 months (or usage time >1000 hrs) whichever is earlier; or if tube ends blacken or if tubes flicker. LED bulbs have longer life of 20,000-30,000 hours while CFL lamps life is 2000-3000 hours.
- Monitor irradiance of the phototherapy machine once every week. Use a flux meter to monitor irradiance. Change light source if irradiance falls below 6-8 microwatt/ cm² /nm.

Caution

- Do not use phototherapy unit under a warmer
- Ensure eye patches do not obstruct nostrils

- For babies below 1.5 kg preferably use phototherapy over incubator
- After switching on the unit, check if all tubes/bulbs are on
- Do not place anything on the phototherapy unit (this blocks air vents).

Trouble shooting

Problem	Possible cause	Corrective action
Too noisy machine or gives too much heat	The fan may not be working optimally or choke is faulty	Rectify the fan or choke
Inadequate irradiance	Machine bulbs covered with dust or reflectors are dirty or Life of bulb over	Clean the dust from unit; Change the bulbs at specified periods
Flickering bulbs or blackened end of tubes	Problem with starter or Tubes life is over	Change starter /bulbs / tube lights as required
Unit is not switching	Problem with electrical socket, fuse or loose contact in plug or damaged mains cord	Take action as per need

*After doing the above procedure(s), if the unit is still having problem, call qualified technician to repair the unit.

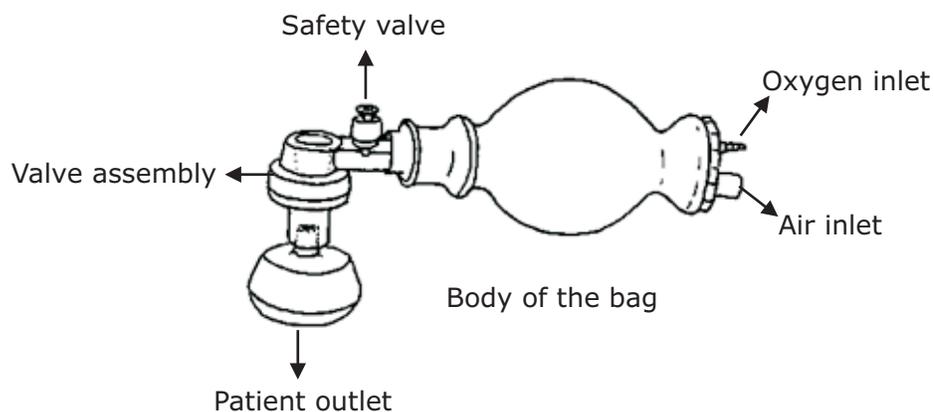
Maintenance

- Change bulbs / tube lights as per recommendation of equipment
- Maintain a log of hours by logbook or time recorder on equipment
- Ensure if inbuilt fan is installed it is working & vents are not covered
- Periodic removal of dust from overhead unit makes unit more efficacious
- If unit overheats the baby, the choke & fan assembly needs repair

Cleaning/Disinfection

- Use moist or dry cloth to clean unplugged unit
- Ensure the reflectors, bulbs remain dust free

IV. RESUSCITATOR BAG



Checking Bag& Mask

- Block patient outlet or mask by palm of your hand
- Squeeze the bag
 - i) You should feel pressure against your hand
 - ii) Check opening of inspiratory valve
 - iii) With higher pressure one can open pop-off safety valve

Procedure

- Choose appropriate size of the bag and mask
- Position the baby in a sniffing position/slight extension
- Provide tight seal
- Use finger tips to generate enough pressure to move chest of baby
- Observe for improvement in heart rate, colour and chest rise
- Follow the rhythm "Squeeze two three, "to ensure 40 to 60 breaths per minute
- For prolonged bag and mask, insert an orogastric tube and then continue bag and mask
- Do not use bag and mask for suspected diaphragmatic hernia and non vigorous babies born through meconium stained amniotic fluid

Decontamination

- i) Washing and rinsing - Disassemble all parts
 - Wash in warm water using a detergent
 - Rinse in clean water
- ii) Disinfection/sterilization
 - Except reservoir whole bag can be boiled, autoclaved or soaked in disinfectant solution. After soaking in disinfectant, clean with distilled water or running water. Dry the valves and then reassemble.

Trouble shooting

Problem	Possible cause	Corrective action
Chest does not rise with B&MV	Leakage around mask Blocked airways Needs higher pressure Mouth closed Pop-off valve gives way due to loose spring	Provide tight seal Re-suction, reposition Use higher pressure Change bag
Bag doesn't generate pressure while tested on palm	Leakage/cracked bag Leakage at air inlet Pop-off valve defective	Change bag Ensure valve push
Baby doesn't improve	Needs higher level resuscitation Needs oxygen	Based on HR-Do CC or use medications Ensure O ₂ supply Attach reservoir.

V. WEIGHING MACHINE (Electronic)

Parts

- Pan or baby tray
- Display panel for weight
- Machine proper
- Mains adapter



Working

- Put on a firm even surface .Wipe clean the weighing pan
- Plug on and wait till the display panel registers zero
- Check for and adjust zero error
- Place a clean cloth/paper
- Press the knob to reset the reading to zero or else you will have to subtract the weight of the cloth from the total weight when baby is weighed along with the sheet
- Place the baby over the cloth/paper
- Keep baby in the middle of the weighing pan; hold the remaining tubes and lines in hand
- Detach as many tubes/equipment as possible prior to weighing. Keep the naked baby on the towel and record the weight (subtract the weight of the cloth if the scale has no facility to reset to zero)
- Record weight on baby record and plot on growth chart

Do's

- Put the weighing scale on a flat, stable surface
- Record weight prior to feeding
- If using pre-weighed splint, reduce the weight from baby's weight
- Always look for and adjust zero error
- Remove excessive clothing
- Record weight only when display is stationary & not fluctuating
- Take care of the different catheters not to get displaced.
- Calibrate using a known standard weight every week.

Don'ts

- Do not stack up line or other objects on the weighing pan when not in use.
- Do not pour water on the electronic display.
- Do not keep the weighing machine in humid atmosphere.

Cleaning and disinfection

- Clean with soap and water; use damp cloth to clean
- Wipe with spirit swab between two babies

Troubleshooting

Problem	Possible cause	Corrective action
The unit does not function	The plug , socket , cable or fuse may be faulty	Correct & repair as necessary
Machine reads ERR or sorry	Too heavy weight is put on the scale	Use appropriate weight to weigh
Low battery	The battery is discharged	Connect power cord to recharge
Machine shows erratic weights	Needs calibration	Use standard weights of 100 /200 gms or ½ kg / 1kg every 7 days for calibration

VI. SUCTION MACHINE (Electric)

Parts

- Motor
- Vacuum gauge with precision regulator
- Suction bottles
- Suction catheter
- Suction tubing

Working

- Connect to mains
- Switch on the unit and occlude distal end to check the pressure. Ensure it does not exceed 100mm Hg
- Take disposable suction catheter of appropriate size
- Connect to suction tubing
- Perform suction gently
- Switch off the suction machine and discard suction catheter

Cleaning & Disinfection

- Wash suction bottle with soap & water
- Change bottle solution (1 % hypochlorite) every day

Do's

- Suction gently
- Maintain asepsis during the suctioning procedure

- Use only disposable suction catheter
- Check adequacy of suction pressure

Don'ts

- Do not do vigorous & deep suction

Troubleshooting

- Check fuse
- Check cord
- Check earthing
- Check for leakages in the bottle/tubing

Maintenance

- Check for adequacy of suction pressure
- Change tubing if leaky or broken

VII. SUCTION MACHINE (Foot Operated)

Parts

- Suction tubing
- Suction bottles



Using the foot suction

1. Ensure that foot suction is close to resuscitation trolley so that it can be operated while resuscitating the baby.
2. Place the foot suction on floor across and in front of resuscitation trolley, with bellows on right side (if you use your right foot) and fluid collection jar on left side.
3. Ensure that suction catheter is placed on baby mattress and tube length is not short.
4. Connect suction catheter to patient end of suction tubing attached to suction machine.
5. Place right foot on bellows and press down ensuring that it slides down in contact with the central vertical metal plate. This ensures that bellows do not tilt outwards, preventing slipping of foot.
6. Foot pressure can be adjusted to ensure adequate suction pressure.
7. Pinch the suction catheter end press bellows and check for suction pressure
 - For safety of newborn maximum suction pressure is limited to 100 mm Hg, irrespective of foot pressure.
 - It is most effective if regular rhythmic compression of the bellows is performed.

Cleaning/sterilization

1. Empty the fluid collection jar. The foot suction must be cleaned immediately after use.
2. The fluid collection jar can be autoclaved at 124°C. This can also be washed with soap and water.
3. Re-assemble when dry.
4. Replace in carry case.
5. Empty fluid jar immediately when filled more than half.
6. In case fluid jar cannot be emptied immediately when full, to prevent overflow of fluid into bellow, open the alternate suction inlet. No suction pressure will be created even if bellow is compressed.

Troubleshooting

1. Check for leakage in bottle/tubing.
2. In case fluid jar cannot be emptied immediately when full, to prevent overflow of fluid into the bellows, open the alternate suction inlet.
3. Check for adequacy of suction pressure.

VIII- OXYGEN CONCENTRATOR

Parts

- Machine with compressor
- Flow meter with /without splitter
- Humidification bottle

Working

1. Plug onto the power supply.
2. Switch on the concentrator using the ON/ OFF button.
3. Once the concentrator is on, a yellow light will come up.
4. Next, adjust the flow to 3-4 liters. This light will be on till the desired concentration of oxygen is achieved, which in most concentrators is nearly 90-93%, after which it goes off.
5. Every manufacturer has its own way of showing the achieved desired concentration. In some concentrators this yellow light will become green after achieving the desired concentration.



Maintenance

- Coarse filter Ensure it is dust free , wash daily
- Zeolite granules Change every 20,000 hrs
- Bacterial filter Change every one year

Trouble shooting

Problem	Possible cause	Corrective action
Too noisy machine	Coarse filter blocked by dust	Wash filter daily
Machine or room gets heated	Machine is near the wall	Keep away from wall or outside the room for free circulation of air
Yellow light is not going off	Desired oxygen concentration not reached	May be due to high humidity or the flow rate is more, which exceeds the capacity of zeolite material. Decrease the flow rate.
Compressor heats up	Malfunctioning of compressor	Look at fan, it may be jammed, and hence may need repair.

IX- PULSE OXIMETER

Parts

- Monitor
- Saturation probes

Working

1. Assemble all necessary equipment.
2. If saturation monitor probe is reusable, cleanse probe with alcohol, let it dry.
3. Connect the power cable to the electric socket and turn monitor on.
4. Apply probe to a site that is well perfused.
5. Ensure both sides of probe are directly opposite each other.
6. Secure probe in place. Avoid edematous, bruised sites and excessive pressure.
7. Set high and low alarm limits for saturation (2% above and below desired limits) and heart rate 100 to 160/min.
8. Set pulse and alarm volumes.
9. Check the waveform or the perfusion index, if available, for the accuracy of the signal.
10. Check for correlation of depicted heart rate on monitor and the actual heart rate by auscultation.
11. Document heart rate, colour, oxygen saturation hourly.
12. Change site of probe at least once per shift.



Precautions

- Do not allow excess ambient light to shine on the probe, if so cover the probe with an opaque material
- Do not tie the BP cuff proximal to the limb on where the probe is fixed
- Do not place equipments generating electromagnetic signals in the vicinity
- Do not run the oximeter on battery alone, if back up power is available

Disinfection

Clean probe with spirit swab before every application. Use soap and water to clean monitor - Do not autoclave, pressure sterilize

- Do not use petroleum based, acetone or other harsh solutions

Trouble shooting

Alarm	Possible cause	Corrective action
Ambient light	Excessive light on sensor	Relocate, cover with opaque paper /cloth
Check sensor	Motion, low perfusion, wrong position	Reposition, relocate
Interference detected	Erratic signal with electromagnetic waves in vicinity like tv, mobile ph.	Remove interference
Low battery	Low internal battery	Connect to AC power
Sensor failure	Broken cable, faulty photodiode, sensor damage	Replace sensor
System failure	Internal component failed	Unit needs service /change

X-SYRINGE INFUSION PUMP

Parts

- Driving Unit
- Control Panel
- Display Panel

Working

1. Connect the power cable to the power slot and fix the infusion pump on to the installation pole.
2. Press the On button for 1 second to switch on the syringe pump. All signals on the display unit will glow for a second.
3. Choose the appropriate size and type of syringe as per the need of the patient.
4. Set the syringe in the slot in the driving unit. To do this, lift up the syringe holder and place the drug filled syringe with the inner and the outer cylinders in their corresponding grooves and



ensure good fixation.

5. The syringe should be connected to the appropriate tubing. Avoid cutting of the IV set tubing to fit the syringe nozzle.
6. Set the rate of infusion using the up and down arrow keys in the control panel.
7. Before starting infusion press the prime button to flush the tubings to remove all air bubbles.
8. Now connect to the patient after ensuring patency of the IV line.

Maintenance

- **Cleaning** : In case of spillage wipe with soft cloth soaked in lukewarm water
- **Disinfection** : Disinfect with cloth dipped in soap and water, in case of blood spilled

Don'ts

- Do not use alcohol based disinfectant
- Do not autoclave
- Do not clean with wet cloth while connected to mains

Trouble shooting

Alarms Message	Possible cause	Corrective action
"OUT OF INFU"	Slider has moved inadvertently	Fix syringe again and restart infusion
"OCCLUSION"	Tube occluded with >60 kPa pressure	Check and remove cause of occlusion; P.N. Unnecessary pushing fluid into the IV line may cause extravasations
"AC FAILURE"	Low internal battery	Connect to AC power
"SYRINGE IN USE"	Syringe removed from holder	Set syringe properly and resume infusion
"NEAR EMPTY"	Infusate almost over cting of compressor	Keep loaded syringe ready

XI - Glucometer

Common brands of glucometers available in India

A) Glucose oxidase based reflectance meters

1. Ames Glucometer (Bayer Diagnostics)
2. One Touch (Johnson & Johnson)
3. Lifescan (Johnson & Johnson)
4. Glucosite (GDS Diagnostics)
5. Refcolux (Boehringer Mannheim)

B) Glucose oxidase & electrode based analyzers

1. Pulsatum (Pulsatum Health Care Pvt. Ltd.)
2. Glucometer Elite (Bayer)

C) Reagent strips for visual reading

1. Dextrostix (Bayer)
2. Glucostix (Bayer)
3. Haemoglukotest (Boehringer Mannheim)

Selection of glucometer

1. The procedure of estimation should be simple. Visual techniques and most of the reflectance meters (Glucometer, etc.) require wiping/washing of the strip after a particular period. Any error here can lead to errors in results.
2. 'One-Touch™, meter does not require any wiping of the strip.
3. The meters should be preferably calibrated for plasma glucose this may improve the precision.
4. The reagent strips should be freely available and the cost should be reasonable.
5. Ensure the strips should be stable for sufficient period of time in tropical climate..

Maintenance

- i) Blood glucose meters must meet accuracy standards set by the International Organization for Standardization (ISO).
- ii) The meters should be calibrated regularly, as recommended by the manufacturers.
- iii) The instrument should not be exposed to excessive humidity, extreme heat or cold for prolonged periods.
- iv) A daily check of the strip guide, reflectance disc and optical window should be made. The strip guide can be cleaned with a brush and water or a mild detergent, after removing it from the instrument. The reflectance disc and optical window can be cleaned with a soft, lint free cloth or lens tissue soaked with water, surgical spirit or alcohol.
- v) The instrument should be handled gently.

Caution for storage of strips

1. As the reagent strips are affected by heat, humidity and excessive exposure to light it should be stored in a cool dark place at a temperature less than 25°C;
2. But these should never be frozen.
3. The bottles contain 'silica gel' to absorb the moisture.
4. The color of the strip should be checked before using it.



SELF EVALUATION

Q1. The size of resuscitation bag for neonates should be

- Less than 240 ml
- Between 240 - 750 ml
- Between 500-750 ml
- Between 240 -1000 ml

Q2. Name the device used for increasing concentration of oxygen in the resuscitation bag

Q3. Resuscitation bag can be disinfected easily by

Q4. Incubator is preferable over warmer in following situations

Q5. Staff nurse must educate mother following instructions while giving phototherapy for jaundice

Q6. In addition to recording weight what are other indications for use of weighing machine

Q7. How would you disinfect the following parts of foot operated suction machine :

- Fluid collection jar : _____
- Rubber stopper : _____

****You will be given individual feedback after you have done self evaluation***



DEMONSTRATION

Demonstration on common equipment available in the hospital will be done. This will be followed by return demonstration and feedback to participants .



VIDEO

Equipment videos on common equipment are available as audio visual podcast and will be shared for discussion.