SAFETY MEASURES WHILE USING ELECTRICAL EQIUPMENTS

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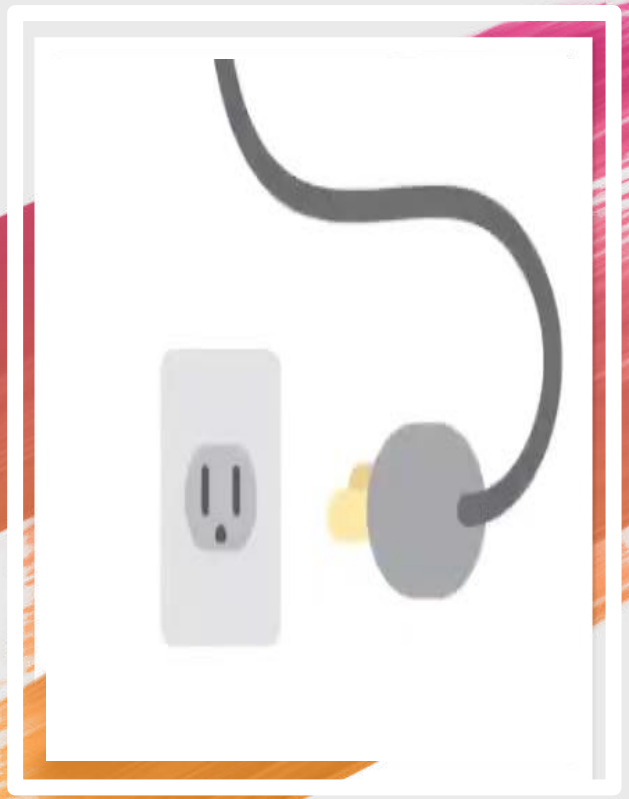
INTRODUCTION

- Electricity is safe to use but may become dangerous in careless hands.
- It may cause fire, damage and fatal or non-fatal accidents.
- This danger from electricity can be avoided by using good quality equipment material, proper wiring and installation as well as efficient maintenance and upkeep of protective devices.



WHAT DOES HAZARD MEAN?

Hazard means:

- Any potential or actual threat to the well being of people, machinery or environment.

Electrical hazard safety means:

- Taking precautions to identify and control and electrical hazards

SAFETY MEASURES TAKEN BY THE THERAPIST:

PROPER HISTORY (BOTH MEDICAL AND SURGICAL) :

- History of the patients previous medical or surgical conditions must be taken properly, because electrotherapy is contra-indicated in some treatment procedures. Eg:- chemotherapy, radiotherapy, any kind of skin allergy or sensitivity, etc.

PROPER POSITIONING OF THE ELECTRODE:

- Positioning of the electrodes must be done following all the preventive protocols as it may lead to electric burns due to increase in current density over a particular area.

INSTRUCTIONS TO THE PATIENT:

- Command the patient not to touch any equipment during the procedure as it may cause burns or fatal injuries.

ADEQUATE DOSAGE:

- Therapist must provide adequate dosage for particular treatment (iontophoresis) should be given, if given more, can be hazardous to patient.

ADEQUATE DISTANCE:

- The adequate distance must be maintained between the equipment and the therapist (UVR, IIR).

“SAFETY MEASURES TAKEN BY THE THERAPIST FOR THE PATIENT:

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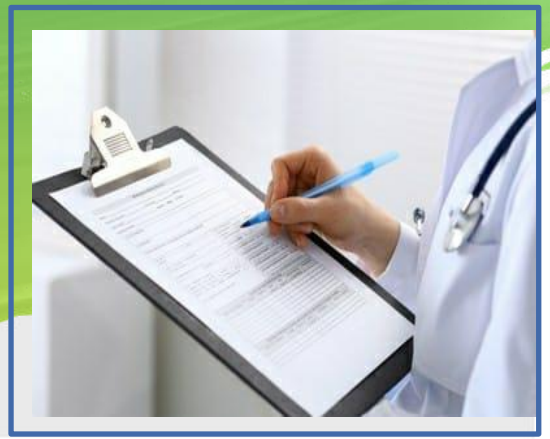
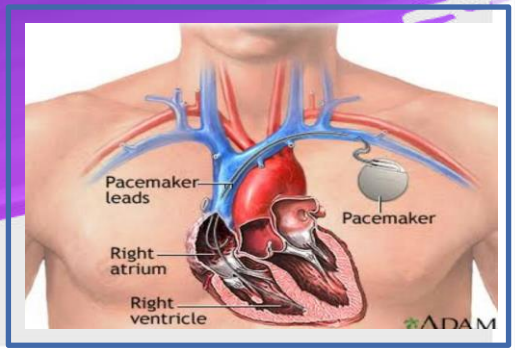


No metal implanted:

- Proper history about the patients previous injuries or any metal implanted in the body must be taken.
- No metal equipment such as bolts, screws or pacemaker must be implanted in the body as it may lead to electric shock or arrhythmia.



Explanation about equipment and possible sensation

- The physiotherapist must inform the patient about all the possible sensations he/she will encounter during the treatment process.
- The physiotherapist must frequently ask the patient whether he/she is perceiving any prickling sensation or not.
- The patient must immediately inform the therapist whenever the current intensity is unbearable or he/she is perceiving stabbing sensation.

Instruction to the patient :

- Command the patient not to touch any equipment during the procedure as it may cause burn or fatal injuries.

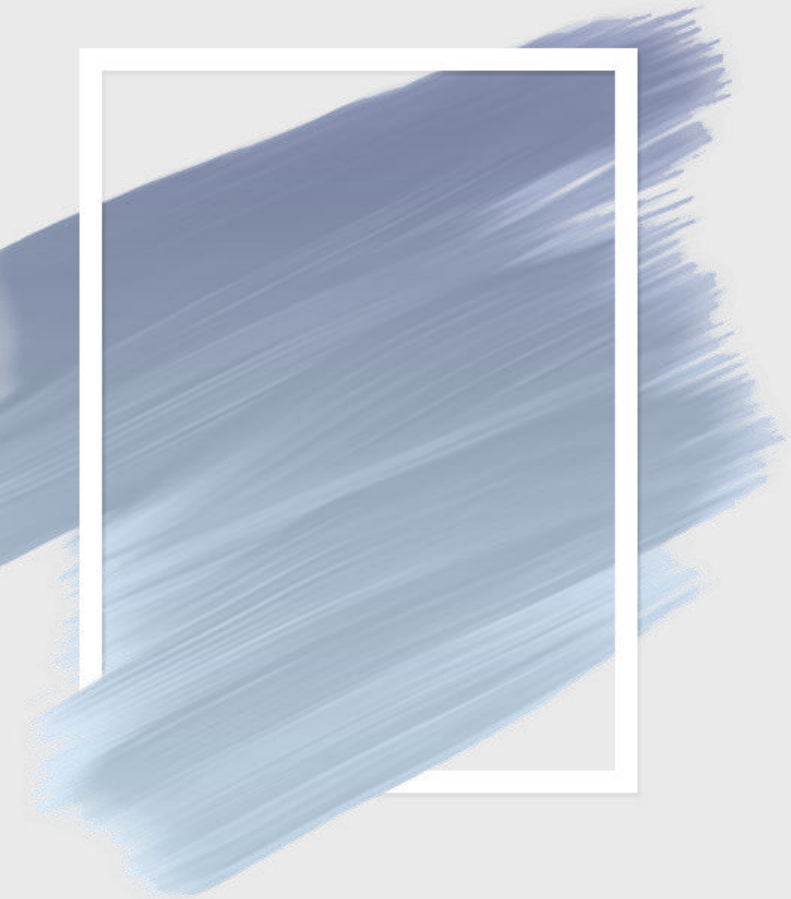
- Ask the patient not to move the part under the treatment frequently as it may cause displacement of electrodes.

Patients clothing must be loose :

- Patients clothing must be loose as it will be beneficial for the therapist to provide the treatment effectively and the physiotherapist can place the electrodes comfortably and properly on the affected area, limb , etc.

Proper positioning of electrodes

- Positioning of electrodes must be done following all the preventive protocols as it may lead to electric burns due to increase in current density over a particular area.



Timely feedback from patient :

- Frequent feedback must be taken from the patient about any possible irritation, stabbing or burning sensation.
- The current must be switched-off immediately if the patient give such feedbacks.

No weight bearing :

- No weight bearing should be done for the body part under the treatment because if the current is applied on the area bearing some weight, it may lead to burns due to undue pressure on that area.

Patient position :

- The physiotherapist must position the patient comfortably according to the physical condition of the patient and the treatment procedure.
- Pillows must be provided to the patient for his/her comfort and stability during the treatment.
- The area under treatment should not be weight bearing.

Body part under the treatment should be covered :

- This is to ensure that the physiotherapist can easily notice any adverse reaction occuring during the treatment and can take preventive measures immediately.

CLINICAL SETUP

SPACIOUS :

- The patient room must be well ventilated and well lit. Good ventilation is the major contributor to the health and comfort of patient.

FLOORS SHOULD NOT BE SLIPPERY :

- It is to ensure that patient are not put at risk of dangerous slips which can worsen their medical condition. So, clinical setup must have anti slip flooring resin flooring, easy cleaning properties for effective drainage and removal of water.

FIRE SAFETY MEASURES:

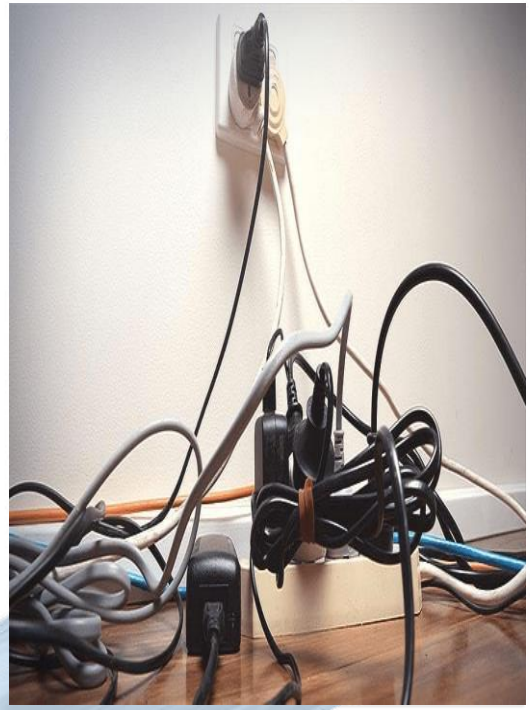
- It includes fire extinguishers, fire alarms and fire exits to prevent any hazard. As, electrical equipments can catch up fire strongly.

THERE MUST BE SEPARATE CABINS FOR DIFFERENT EQUIPMENTS:

- So that the wiring and electrodes of different equipments doesn’t mix with each other.

PROPER WIRING:

- Wiring should be proper insulated to increase the safety and efficiency and to prevent the accidental contact of wire with other conductors of electricity, which might result in an unintentional electric current through those other conductors. Switch boards nearby to the patient.



AVOID OVERLOADING OF CIRCUIT:

- Overloading of circuit occurs when the device draw more electrical power than a circuit can safely handle.
- Due to which the breaker will trip and shut off the power to your circuit.
- Without breaker protection, the wiring would begin to overheat, leaving the exposed wires that leads to fire.
- So overloading can be avoided by inspecting the wiring.

EARTHING:

- Earthing is used to prevent someone from an electric shock. It does this by providing a path for the faulty current to flow to earth. It causes the protective device (either a circuit-breaker or fuse) to switch off the electric current to the circuit that has fault.

EQIUPMENTS

Good brand equipment:

- It is always beneficial to use good brand equipments , as their manufacturing and designing is up to date.

Fuses should be used:

- It is the cheapest form of protection.
- It's operation is completely automatic and require less time as compare to circuit brakers
- Fuse is a electrical safety device that operates to provide overcurrent protection of an electrical circuit.
- It's essential component is a metal wire or strip that melts when too much current flows through it, thereby stopping or interuppting the current.

Electrodes and its lead:

- There should not be any tearing and wearing of leads, electrodes and wires.

- The physiotherapist should check the electrodes and their leads.
- If there is any tearing and wearing then it could lead to electric shock or electric burns.

- They all should be properly insulated to prevent electric shock.

Properly timely servicing:

- The advantages of timely servicing of modalities is that-n
- If there is any problem occuring with their working, then it will be corrected at proper time, and we can stop it only there and it will not convert into a big trouble.

Awareness of indication and contra-indications:

- Physiotherapist should know about the indication and contra indication of each and every modality.
- For eg- wound healing - every modality is containdicated for wound healing except HVPS.

Maintain adequate distance between equipment and therapist:

- There should be an adequate distance between equipment and therapist because if therapist is dealing with IIR or UVR type modalities, then these type of modalities use radiation for treatment. If therapist is not maintaining a proper distance then his/her body will also absorb these rays or radiations which can be harmful for the therapist.

Adequate dosage:

- If given more, it can be hazardous to patient.
- Adequate dosage for particular treatment (iontophoresis) should be given.

The major hazards associated with the :

1. ELETRIC SHOCK
2. BURNS

- Electric shock occurs when body becomes part of electric circuit, either when an individual comes with CONTACT

Contact can be of 2 ways:

- DIRECT CONTACT: refers to a person coming into contact with a conductor which is live in normal circumstances.

- INDIRECT CONTACT: refers to a person coming into contact with any part of electric circuit which is not normally live , but has become live due to an accidental insulation failure or some other fault.

THE SEVERITY AND EFFECTS OF AN ELECTRICAL SHOCK DEPENDS ON:

1. Amount of current
2. Length of time of exposure
3. Pathways through body
4. Skin is dry / wet

AC current (mA)	Effect on human body
1	Slight tingling sensation
2-9	Small shock
10-24	Muscles contract causing you to freeze
25-74	Respiratory muscles can become paralysed; pain; exit burns often visible
75-300	Usually fatal; ventricular fibrillation; entry & exit wounds visible
>300	Death almost certain; if survive will have badly burnt organs and probably require amputations

STEPS TO MINIMIZE ELECTRIC SHOCK HAZADS

Steps to minimize electric shock hazard:

1. All equipment should be checked before (as a physiotherapist , our top goal is to help patients to recover and heal by creating a safe and effective environment

- LEAD WIRES- lead wire should be replaced after every 6 months because it can degrade/ exposed copper deterioration of lead wire cause shocking sensation to patient. If any damaged noted on lead wire , it is safety to replace the lead wire to avoid injury to the patient or user.

- SELF ADHESIVE ELECTRODE – manufacturers recommend that they should be replaced after every 15 treatment. By exceeding the number of treatments used with self adhesive electrodes they tend to wear out which can cause patient discomfort or injury

Make sure that electrode is adhering and making contact with the skin and across the entire electrode. Thoroughly clean the skin area to be treated before placing the electrode.1

2. **Rule out contraindications, precautions to the specific electrotherapeutic application considered.**

- Basic contraindications:

On eyeball or over the vessels that may contain blood clot Undiagonsed pain- until etiology is established.

- Heart problems- pacemakers
- Epilepsy
- Haemorrhage
- Acute trauma or fracture
- Recent surgical procedures where muscle contractions may disrupt healing process
- Pregnant utreus
- Area of skin which loss Normal sensation
- Carotid sinus

- Laryngeal and pharangeal muscle- contractions may be strong enough to close the airway or cause difficulty in breathing
- Broken or damaged skin
- Stimulation should not be applied trans thoracically in that area because of electrical current into hear may cause cardiac arrhythmias
- Don’t apply current in trans- cerebrally (through the head)

- Always use a three pin plug where safe ground is fixed.
- Never use damaged plugs/ cords or extension cords
- Use only the power switch to turn power on and off
- Always explain the treatment procedures to patient, describe what sensation the patient is to expect during therapy as well as those sensation what are not desired
- All type of electrotherapeutic equipments should be periodically tested and preventive maintenance by biomedical engineer.
- Physiotherapy department floor should be dry and moist free. Wooden couches and rubber sheet are recommended
- Instrument/ devices should meet the standards , and approved by nationally Recognised testing laboratory, leaking current less than 50-1000 **µA** in order to receive approval.

Standard precautions to keep patients safe:

- Hand hygiene
- Respiratory hygiene
- Personal protective equipments
- Medical equipment, environmental cleaning,waste disposal.

Electric shock treatment

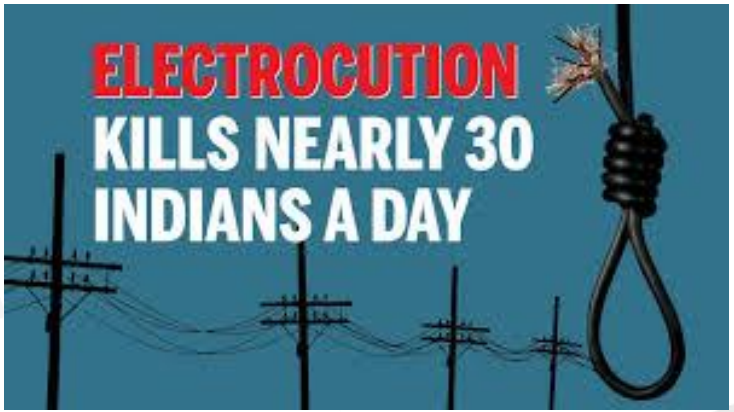
Call Emergency number/Ambulance

- The person has been injured by an electric shock
- Electrical shock always need emergency medical attention- even if the person seems to be fine afterward
- Separate the persons from currents source- unplug the equipment if plug is undamaged not shut off power via circuit breaker, fuse box or outside switch
- Do CPR if necessary
- Check for other injuries

KEY messages:

- All should have basic knowledge of shock and precautions that would be taken

- To STAY ALIVE, you have to STAT ALERT



REFERENCES:

1. Textbook of Electrotherapy.Jagmohan singh

2. Clayton’s Electrotherapy

3. Essentials of Electrotherapy.Purusotham chippala

4. Safety.blr.com

5. Standards.dor.com

6. Osha.gov.com

7. https://slma.cc

THANK YOU