**Electrotherapy**

**Electric shock**

A shock is a painful stimulation of sensory nerves caused by a sudden flow, cessation or variation in the current passing through the body.

It can be caused by poorly designed or badly serviced electro-medical apparatus (Physiotherapy).

**Severity of shock**

* The greater the current which passes through the body, the more severe is the shock.
* Most apparatus used in physiotherapy departments is plugged into the mains supply of 240 volts and frequency 50 Hz. This therefore represents a hazard as a source of electric shock.
* A high resistance reduces the intensity of current, so if exposed parts of the circuit are touched with damp hands the shock is more likely to be severe than if the hands are dry.
* The lower the resistance of the skin, the greater the current passes through the body.
* The severity of the shock also depends on the path taken by the current and a strong current through the head, neck, heart or whole body might prove fatal.
* Shocks are also generally more severe with alternating than with direct current because the intensity of alternating current is continually changing and so it provides stronger sensory stimulation. It may also produce tetanic muscular contractions, which make it impossible for the victim to let go of the conductor.

**Effects of electric shock**

* Following a Minor Shock
* The victim may be frightened and distressed, but does not lose consciousness.
* Following more severe electric shock
* Fall in Blood Pressure and sometimes Loss of Consciousness.
* Following extreme cases
* Cessation of respiration
* May be accompanied by cardiac arrest due to ventricular fibrillation resulting from electrical stimulation of the heart.
* Cessation of respiration is recognized by lack of respiratory movements and cyanosis,
* Cardiac arrest is recognized by absence or abnormality of respiratory movements, absence of pulse in the carotid artery and fully dilated pupils.

**Treatment of electric shock**

Following a shock, the first step is to disconnect the victim from the source of supply; the current should be switched off at once. If there is no switch in the circuit the victim must be removed from contact with the conductor, but the rescuer must take care not to receive a shock himself from touching the affected person, so the contact with victim should be made only through a thick layer of insulating material.

Following a minor shock

* Call/consult a medical officer.
* Patient is reassured and allowed to rest.
* Water may be given to drink
* Hot drinks should be avoided as it causes vasodilatation and sweating and consequently a further fall in blood pressure.

Following a more severe shock

* The victim is laid flat, in this position respiratory passages becomes clear.
* Tight clothing is loosened and plenty of air allowed.
* Undue warmth is avoided as it causes vasodilatation, sweating, & fall in blood pressure
* If pt. is unconsciousness then nothing is given by mouth
* Medical officer should be called immediately.
* If Apnea, then airway should be cleared & artificial respiration should start immediately by mouth-to-mouth or mouth-to-nose method or O2 should be given by a bag and mask.
* If cardiac arrest then External cardiac massage in addition to above.
* In all cases, apnea and/or cardiac arrest, call a medical officer immediately.

**Causes of Shock**

Patient may receive shock while electrical treatment as a result of sudden increase in the current. This can occur if low frequency or direct current is switched on with the control turned up, or if insufficient time is allowed for the apparatus to warm up.

Shock can also occur if the pt. touches an exposed part of the circuit.

**Precautions**

* All apparatus should be tested before use.
* All connections should be checked before using the electrical instrument.
* Controls should be at zero before switching on the electrical instrument.
* Adequate warming up time should be allowed.
* Current intensity should be increased with care.
* Pt. should never be allowed to touch electrical instrument.
* Apparatus should be serviced regularly by a competent electrician.
* Physiotherapist may also receive shock while handling equipment if two live parts of the circuit are touched at the same time.
* Apparatus should always be disconnected from the source of supply before faults are investigated.

**Earth shock**

When a shock is due to a connection between the live wire of the main and earth, is known as earth shock.

**The Earth Circuit**

Electric power is transmitted by one live cable and one neutral cable which is connected to earth.

The earth forms part of the conducting pathway and any connection between the live wire of the main and earth completes a circuit through which current passes. If any person forms part of this circuit he receives an earth shock.

Thus an earth shock is liable to occur if any person makes contact with the live wire of the main while connected to earth.

**Examples of Earth Shock**

* A patient, who is receiving treatment with a current which is not earth-free, may rest her hand on a water pipe.
* Physiotherapist holding an electrode that is connected to the live wire may touch the earthed apparatus-casing.
* If someone standing on a damp stone floor touches the casing of apparatus which is not connected to earth and with which the live wire is in contact, then person will receive an earth shock.

**Precautions against Earth Shock**

* Physiotherapy department should be arranged so that there is minimal danger of getting an earth shock.
* Water and gas pipes should be out of reach of the apparatus and should be out of reach of patient receiving treatment.
* Flooring should be covered with insulating material and should be kept dry.
* If the floor is not of insulating material, then non conducting mat should be placed under the patients’ feet during electrical treatments.
* Switches must break the live wire and fuse must be on the live wire, so if an earth circuit is made and a large current passes the fuse blows and stops the current flow.
* The metal casing of all apparatus must be connected to earth.
* Patient should not be permitted to touch the apparatus during treatment.
* Special care should be taken while giving electrical treatment in baths, because during this, an earth connection is easily made.
* The bath must be of insulating material.
* Leaking baths must not be used.
* If a rubber hose is used for filling the bath, then it must be removed before beginning the treatment because damp rubber hose can also pass current.
* Water should not be added to the bath during treatment.
* Current used for the treatment of patient should always be earth-free.