

AmbujaNeotia



**THE NEOTIA
UNIVERSITY**

ज्ञानम् आत्म प्रदीपाय

UGC Enlisted & Recognised

Department of Physiotherapy

School of Health Science

Bachelor of Physiotherapy

(BPT)

Electrotherapy I Practical Manual

Course Code: BPT 373

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Certificate

This is to certify that Mr./Ms. with
UID number of Bachelor of
Physiotherapy Semester 3rd has satisfactorily completed the practical prescribed
by the Neotia University for the year

.....
Signature of Student

.....
Signature of Faculty

Date of Submission:

Electrotherapy Application Procedures

Part 1: Patient's Preparation Procedures

- Receiving the patient
 1. Introduce yourself to patient: Good morning sir / madam. I am your therapist (*Your Name*) who is going to treat you.
 2. Give assurance/confidence: Don't worry; I will do my best for you.
- Case sheet reading
 1. Go through the medical reports of the patient and look for Assessment and diagnosis done by the physician, Laboratory investigation reports.
 2. Find out diagnosis/general contraindications/previous physiotherapy treatment etc.
 3. Verify the absence of contraindications and ask about previous treatment of current condition
 4. Say, "I will go through your medical sheet"
- Checking contraindications and area to be treated
 1. By building a rapport with the patient and by case sheet reading, check the general contraindications and specific contraindications (related to the modality to be used).
 2. Check for:
 - a) Hyper pyrexia
 - b) Epilepsy
 - c) Severe renal and cardiac problems
 - d) Severe hypo/hypertension
 - e) Cardiac pacemakers

- f) Infections
 - g) Pregnant women
 - h) Metal implants
 - i) Mentally retarded/upset patients
 - j) Malignancy
 - k) Anterior aspect of neck/carotid sinus/eyes
3. Check for local contraindications:
- a) Open wounds
 - b) Scars
 - c) Local skin infections
 - d) Dermatitis, Abrasions, and Eczema
 - e) Localized haemorrhagic spots
 - f) Skin sensitivity
4. Check the area to be treated for:
- a) Jewellery
 - b) Check for light touch perception (piece of cotton and/or brush)
 - c) Check for sensation (pin prick sensation)
 - d) Check circulatory conditions (Pulses, capillary refill, pallor)
 - e) For functional limitation and disability: (e.g. ROM, Pain, muscle strength)

Part 2: Equipment Preparation Procedures

- Tray preparations
 - 1. Skin resistance lowering/testing tray:
 - a) Pillows
 - b) Cotton
 - c) Soap
 - d) Towel

- e) alcohol swab
- f) Mackintosh
- g) Petroleum jelly
- h) Test tubes (hot & cold)
- i) U-pin (sharp & blunt)
- j) Clips
- k) Bowl of water
- l) Hot & cold packs

2. Treatment tray:

- a) Pillows
- b) Towel
- c) Bed sheet
- d) Aqueous Gel
- e) Cotton
- f) Adhesive tapes
- g) Straps/goggles
- h) Salt/Powder (for iontophoresis)
- i) Scissor/ Inch tape
- j) Paper
- k) Graph paper (for SD curve)
- l) Pencil/scale/eraser
- m) Machine & accessories
- n) Sand bags/crepe bandages
- o) Sanitizer

- Preparation before Treatment

1. Select the proper electrical stimulation unit (e.g. TENS, NMES, HVPC, IFT, Microcurrent, diadynamic) and accessories (electrodes, cables, Adhesive tapes and Straps), conducting material (e.g. sponge pad, aqueous gel).

2. The apparatus and accessories needed should be assembled and suitably positioned.
 3. Obtain and position pillows, bed sheet and towel for draping.
 4. Skin resistance lowering & sensation testing
- Apparatus preparation
 1. Check the apparatus, stimulators & accessories like electrodes, leads, cables, plugs, power sockets, switches, controls, dials and others.
 2. Visually check the above parameters and indicator lights for cracks and breaks.
 3. Finally ensure the amplitude controls are at zero.
 4. Apparatus checking
 - a) Demonstration of the treatment
 - b) Check the functioning of machine in front of the patient
 - c) Explanation of treatment

Part 3: Procedures for Application

- Positioning the patients:
 1. Comfortable
 2. Relaxed
 3. Appropriate
 4. The position of the part to be treated should be completely relaxed.
 5. Patient should be made comfortable by using maximum number of pillows and sand bags for the support.
 6. Position of the patient should be such that all the joints of the body are completely relaxed.
 7. If possible, use a position in which patient can see the treatment.
- Skin resistance lowering and sensation testing:

1. Do skin resistance lowering
2. Neatly & perfectly
3. Use items required in an orderly manner
4. Procedure:
 - a) Uncover the part to be treated.
 - b) Make use of cotton irrigated in water and/or alcoholic swap to clean the area to be treated.
5. Pain and Light Touch Sensation
 - a) Initial evaluation of the sensory system is completed with the patient lying supine, eyes closed. Instruct the patient to say "sharp" or "dull" when they feel the respective object.
 - b) Show the patient each object and allow them to touch the needle and brush prior to beginning to alleviate any fear of being hurt during the examination
 - c) With the patient's eyes closed, alternate touching the patient with the needle and the brush at intervals of roughly 5 seconds.
 - d) Make certain to instruct the patient to tell the therapist if they notice a difference in the strength of sensation on each side of their body.
 - e) Alternating between pinprick and light touch. Touch one body part followed by the corresponding body part on the other side (e.g., the right shoulder then the left shoulder) with the same instrument. This allows the patient to compare the sensations and note asymmetry.

- Checking equipment and selecting treatment parameters
 1. Select the type of application of the treatment wherever possible, then check the apparatus
 2. Adjust the pulse rate, pulse width, and mode of stimulation to desired setting if possible
 3. Set a timer for the appropriate treatment time and give the patient a signalling device (if available). Make sure the patient understands how to use the signalling.
 4. During this process of application therapist will demonstrate the treatment to the patient, and give an explanation of the treatment to the patient. Explain about the type of sensation, which will be experienced by the patient, and monitor the patient's response, not the stimulator.
- Positioning of Electrodes
 1. Select the electrodes properly (rubber electrodes, self-adhesive, metal pin or prop electrode) and suitable size (small, medium large),
 2. Active electrode(s) [smaller] is stimulating electrode and placed on the target muscle, greatest current density – treatment effect.
 3. Place electrodes properly in the following area (s)
 - a) On and /or around the painful area.
 - b) Over specific dermatome corresponding to the painful area.
 - c) Over specific myotomes corresponding to the painful area.
 - d) Spinal cord segment.
 - e) Course of peripheral nerve.
 - f) Motor point.
 - g) Over trigger point.
 - h) Acupuncture point
- Placing the electrodes: (Checklist)

1. Use micropores or straps for placing the electrodes.
2. Apply aqueous gel evenly or sponge pad (s) on entire electrode.
3. Maintain good contact between the skin and the electrodes
4. Tie the electrodes with even pressure.
5. Wires or leads should not cross each other and/or over the patient during the treatment.
6. Confirm connections.

Part 4: Instructions and warnings

- Before starting treatment, therapist must give following instructions and warnings to the patient

1. Instructions:

- a) Don't move during the treatment.
- b) Don't sleep while the treatment is going on.
- c) Don't touch the cables, apparatus, therapist, and any other metal nearby them.

2. Warnings:

- a) Remind the patient to inform you when he/she feels something. Do not tell the patient what it will feel.
- b) As there are chances of getting a blister due to excessive current or overheating, so ask the patient to inform you if the current is not comfortable or heating is more.
- c) If there is any burning sensation ask the patient to immediately inform you, as it might lead to burn.
- d) Ask the patient to inform you if the position is not comfortable.
- e) The warning given should be noted on the patient's record.

Part 5: Treatment, follow-up and termination

- Treatment:
 1. Turn on the equipment and increase the amplitude slowly till it is comfortable for the patient.
 2. Duration of the treatment is decided on the basis of the condition.
 3. Recheck the patient's response after the first 5 minutes by asking the patient how it feels, if the sensation has diminished, adjust the amplitude appropriately.
 4. Observe the patient throughout to ensure that treatment is progressing satisfactorily and without adverse effects.
- Termination of treatment:
 1. When the treatment time is over, turn the intensity to zero and move the electrodes away from the patient
 2. Remove the electrodes and clean the patient.
 3. Assess the treatment efficacy and adverse effects
 - a) Ask the patient how the treated area feels
 - b) Visually inspect the treated area for any adverse reaction
 - c) Perform functional test as indicated
 4. Manage if anything & give instruction regarding the next session.
 5. Windup procedure

Part 6: Documentation of treatment

- An accurate record of all parameters of treatment:
 1. Region treated, (knee, shoulder, elbow, back, neck)
 2. Conditions stage (acute, subacute, chronic)
 3. Treatment modality
 4. Parameter of treatment technique, dosage, frequency and duration
 5. Assessment parameter (pain, ROM, muscle strength etc.,) that reflect the resultant effect.
 6. Adverse effect (erythema, burning, blisters) if any.

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Identification of Motor Points

Part1: Materials Needed

- Electrical stimulation unit with a hand-held applicator
- Electrodes and lead wires appropriate for the electrical stimulation units.
- Accessories in treatment tray.

Part 2: Procedures

- Attach the dispersive electrode and manually move the electrode with one hand while controlling the output intensity with the other.
- Set the following stimulation parameters:
 1. Pulse duration
 2. Pulse frequency
 3. Pad alternating rate
 4. Modulation parameters
 5. Polarity of the active electrode: Negative
 6. Duty cycle

Note: Not all parameters will apply to each unit.

- Reset the generator's output intensity to zero, and wet the applicator's tip with water or gel.
- Place the applicator tip on the expected site, and slowly increase the intensity to where a slight muscle contraction is visible.

Documentation

Upper Extremity (Palmar Aspect)

- Identify and mark the motor points.

- What parameters did you use?
 1. Frequency:
 2. Pulse Duration:
 3. On/Off Times:
 4. Waveforms:
- What were the electrode placement sites?
 1. Active:
 2. Inactive:
- What was the position of the patient?

Upper Extremity (Dorsal Aspect)

- Identify and mark the motor points.

- What parameters did you use?
 1. Frequency:
 2. Pulse Duration:
 3. On/Off Times:
 4. Waveforms:
- What were the electrode placement sites?
 1. Active:
 2. Inactive:
- What was the position of the patient?

Lower Extremity (Thigh)

- Identify and mark the motor points of motor point.

- What parameters did you use?
 1. Frequency:
 2. Pulse Duration:
 3. On/Off Times:
 4. Waveforms:
- What were the electrode placement sites?
 1. Active:
 2. Inactive:
- What was the position of the patient?

Lower Extremity (Leg)

- Identify and mark the motor points of motor point.

- What parameters did you use?
 1. Frequency:
 2. Pulse Duration:
 3. On/Off Times:
 4. Waveforms:
- What were the electrode placement sites?
 1. Active:
 2. Inactive:
- What was the position of the patient?

Stimulation of Nerves

Part1: Materials Needed

- Electrical stimulation unit with an adjustable pulse duration (TENS or neuromuscular electrical stimulation recommended).
- Electrodes and lead wires appropriate for the electrical stimulation units.

Part 2: Eliciting Motor Responses to Electrical Stimulation

- Set the stimulation parameters:
 1. Pulse duration: lowest possible value
 2. Pulse frequency
 3. Pad alternating rate
 4. Modulation parameters
 5. Duty cycle
 6. Polarity

Note: Not all parameters will apply to every unit.

- Position the stimulation unit so that the subject cannot see the intensity reading.
- Slowly increase the intensity to the level where the subject first reports the sensation of electrical current flow. Record the output intensity on the grid provided.
- Further increase the intensity until a visible muscle contraction can be seen, and record the output intensity.
- Continue to increase the intensity until the subject reports discomfort resulting from the stimulation.
- Reduce the intensity to zero, and record the output intensity.

- *Cautions When Working with Motor Levels of Electrical Stimulation:*

1. Do not increase the intensity during the off time. When the on-time resumes, this could result in a “surprise” for the patient, which would be uncomfortable.
2. Provide the patient with the emergency stop button, if applicable, or at a minimum, provide a method for him or her to contact you if needed during the unattended portion of the treatment time.
3. Remember that electrode size influences the ease of eliciting a comfortable muscle contraction.
4. Large electrodes generally have lower resistance levels, which translate into lower intensities necessary to elicit a muscle contraction.

Nerve Stimulation

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Nerve Stimulation

- Name of the muscle(s):

- Placement of electrode:
 - 1. Active:
 - 2. Inactive:
- Type of electrode:
 - 1. Active:
 - 2. Inactive:
- Parameters set:
 - 1. Pulse duration:
 - 2. Pulse frequency
 - 3. Treatment time:
- Indications:

- Contraindications/ Adverse reactions:

Nerve Stimulation

- Name of the muscle(s):

- Placement of electrode:
 - 1. Active:
 - 2. Inactive:
- Type of electrode:
 - 1. Active:
 - 2. Inactive:
- Parameters set:
 - 1. Pulse duration:
 - 2. Pulse frequency
 - 3. Treatment time:
- Indications:

- Contraindications/ Adverse reactions:

Nerve Stimulation

- Name of the muscle(s):

- Placement of electrode:
 - 1. Active:
 - 2. Inactive:
- Type of electrode:
 - 1. Active:
 - 2. Inactive:
- Parameters set:
 - 1. Pulse duration:
 - 2. Pulse frequency
 - 3. Treatment time:
- Indications:

- Contraindications/ Adverse reactions:

- Name of the muscle(s):
- Placement of electrode:
 1. Active:
 2. Inactive:
- Type of electrode:
 1. Active:
 2. Inactive:
- Parameters set:
 1. Pulse duration:
 2. Pulse frequency
 3. Treatment time:
- Indications:
- Contraindications/ Adverse reactions:

Nerve Stimulation

- Name of the muscle(s):
- Placement of electrode:
 1. Active:
 2. Inactive:
- Type of electrode:
 1. Active:
 2. Inactive:
- Parameters set:
 1. Pulse duration:
 2. Pulse frequency
 3. Treatment time:
- Indications:
- Contraindications/ Adverse reactions:

- Name of the muscle(s):
- Placement of electrode:
 1. Active:
 2. Inactive:
- Type of electrode:
 1. Active:
 2. Inactive:
- Parameters set:
 1. Pulse duration:
 2. Pulse frequency
 3. Treatment time:
- Indications:
- Contraindications/ Adverse reactions:

Nerve Stimulation

- Name of the muscle(s):

- Placement of electrode:
 - 1. Active:
 - 2. Inactive:
- Type of electrode:
 - 1. Active:
 - 2. Inactive:
- Parameters set:
 - 1. Pulse duration:
 - 2. Pulse frequency
 - 3. Treatment time:
- Indications:

- Contraindications/ Adverse reactions:

Nerve Stimulation

- Name of the muscle(s):
- Placement of electrode:
 1. Active:
 2. Inactive:
- Type of electrode:
 1. Active:
 2. Inactive:
- Parameters set:
 1. Pulse duration:
 2. Pulse frequency
 3. Treatment time:
- Indications:
- Contraindications/ Adverse reactions:

- Name of the muscle(s):
- Placement of electrode:
 1. Active:
 2. Inactive:
- Type of electrode:
 1. Active:
 2. Inactive:
- Parameters set:
 1. Pulse duration:
 2. Pulse frequency
 3. Treatment time:
- Indications:
- Contraindications/ Adverse reactions:

Nerve Stimulation

- Name of the muscle(s):

- Placement of electrode:
 - 1. Active:
 - 2. Inactive:
- Type of electrode:
 - 1. Active:
 - 2. Inactive:
- Parameters set:
 - 1. Pulse duration:
 - 2. Pulse frequency
 - 3. Treatment time:
- Indications:

- Contraindications/ Adverse reactions:

Nerve Stimulation

- Name of the muscle(s):

- Placement of electrode:
 - 1. Active:
 - 2. Inactive:
- Type of electrode:
 - 1. Active:
 - 2. Inactive:
- Parameters set:
 - 1. Pulse duration:
 - 2. Pulse frequency
 - 3. Treatment time:
- Indications:

- Contraindications/ Adverse reactions:

Pain Management with Electrical Stimulation

TENS & IFT

Part1: Materials Needed

- High-volt pulsed stimulator
- Interferential therapy (IFT) unit
- TENS unit
- Lead wires for the stimulators
- Electrically conductive gel
- 4 equal-sized electrodes
- Straps or paper tape to secure electrodes

Part 2: Procedures

- Clean the area appropriately to reduce resistance.
- Set the parameters for pain control using the charts below.
- Increase the intensity gradually according to the subject's responses.
- Ask the subject to rate their pain or comfort level on a VAS or 0–10 scale.
- Use several different pain control settings and record the treatment parameters and subject comfort score in the record book.

Part 3: Documentation

- Determine and consider the following:
 1. Which modality would be indicated for pain relief?
 2. What precautions there might be for the patient
 3. What the parameter would be for the patient and your rationale for those parameters
 4. Where the electrodes should be placed, how many, and why
 5. Whether more than one mode could be indicated for pain relief

6. Whether or not the patient might benefit from home use of a portable stimulator, and your rationale
- The following parameters must be documented:
 1. Treatment goal: Sensory analgesia or pain management
 2. Pre-treatment pain assessment: Visual analogue or other quantifiable measure
 3. Post-treatment pain assessment: Same instrument that was applied pre-treatment
 4. Electrode placement sites

Documentation

TENS

- Position of the patient:
- Type of TENS:
- Placement of the electrodes:
- Parameters:
 1. Output intensity
 2. Pulse frequency
 3. Phase duration
 4. Mode
 5. Electrode arrangement
- Indications:
- Contraindications/ Adverse reactions:

Documentation

IFT

- Position of the patient:

- Placement of the electrodes:

- Parameters:
 1. Carrier frequency
 2. Burst frequency
 3. Sweep
 4. Electrode arrangement
 5. Output intensity

- Indications:

- Contraindications/ Adverse reactions:

Iontophoresis

Part1: Materials Needed

- iontophoresis unit (NMES)
- electrodes, lead wires, and accessories
- medication prescribed for the condition
- moisturizing lotion

Part 2: Procedures

- Cautions with Direct Current Applications:
 1. Always ask the patient whether or not he or she is allergic to the medication that will be applied during the iontophoresis treatment.
Document that the patient has stated that there is no known allergy to the medication to be administered before treatment begins.
 2. Direct current may cause an itching sensation underneath the electrode. This may be a sign of tissue burning. Patients should be cautioned to call the clinician if this occurs during the treatment.
 3. Patients must be cautioned not to touch or move the electrodes during the treatment time with direct current. This could affect current density and potentially result in a burn.
- Phoresing Tap Water
 1. Inspect the skin in the treatment area and make sure that it is clean, free of oils and/or surface debris. The scrubbing helps to further reduce skin resistance, which enhances the flow of current across the skin.
 2. Prepare both the active and dispersive electrodes.
 3. The active electrode must be the same polarity as the medication.

4. Apply the dispersive electrode to the muscle belly approximately 3 inches from the active electrode. The dispersive electrode is larger.
5. Turn the unit on and slowly increase the intensity using the dosage chart. Try each of the intensity levels to see what it feels like. Remember that it is better if the patient does not feel anything. Longer treatment times permit transdermal passage of the medication across the skin with less skin irritation.
6. Apply a moisturizer to the area following treatment with iontophoresis.

Part 3: Documentation

- The following parameters must be documented:
 1. Parameters of the treatment
 - a) Intensity
 - b) Treatment area
 - c) Medication used
 - d) Duration of application
 2. It is necessary to record the medium and the medication used.
 3. Position for treatment.
 4. Assessment and reassessment tools must be documented in the patient record.

Documentation

- Area to be treated:
- Position of patient:
- Placement of electrode:
 1. Active:
 2. Inactive:
- Type of electrode:
 1. Active:
 2. Inactive:
- Parameters set:
 1. Pulse duration:
 2. Pulse frequency
 3. Treatment time:
- Drug prescribed:
- Indications:

- Contraindications/ Adverse reactions:

Strength Duration Curve

Part1: Materials Needed

- Electrical stimulation unit with a hand-held applicator
- Electrodes and lead wires appropriate for the electrical stimulation units.
- Accessories in treatment tray.
- Graph paper, pencil, scale.

Part 2: Procedures

- Set the following parameters:
 1. Pulse duration: 100 μ sec
 2. Frequency: 50 pps
 3. Intensity: 0
 4. Continuous on time
- Increase the intensity. At what level sensation is experienced?
- Set the following parameters:
 1. Pulse duration: 200 μ sec
 2. Frequency: 50 pps
 3. Intensity: 0
 4. Continuous on time
- Increase the intensity. At what level sensation is experienced?
- Set the following parameters:
 1. Pulse duration: 0 μ sec
 2. Frequency: 50 pps
 3. Intensity: as high as possible
- Increase the intensity. At what level sensation is experienced?
- Fill in the graph with the data that you have collected. (Intensity is on the vertical axis, and pulse duration is on the horizontal axis.)

Attach graph here: Innervated muscle

Attach graph here: Denervated muscle

Attach graph here: Partially Innervated muscle

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Chronaxie and Rheobase

Part1: Materials Needed

- Electrical stimulation unit with a hand-held applicator
- Electrodes and lead wires appropriate for the electrical stimulation units.
- Accessories in treatment tray.
- Graph paper, pencil, scale.

Part 2: Procedures

- Follow the same procedure of SD curve
- Plot the graph
- Mark the chronaxie and rheobase

Part 3: Documentation

- Calculate the chronaxie and rheobase

Attach graph here:

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