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A Practical Guide for Physiotherapy Students

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Trupti S Deshmukh
Shruti S Sarkar

ELECTROTHERAPY

OSPE Checklist and DOPS

A Practical Guide for Physiotherapy Students

CBS Physio Brid Series

ELECTROTHERAPY

OSPE Checklist and DOPS

A Practical Guide for Physiotherapy Students

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She is a dedicated academician and clinician with a strong interest in enhancing practical physiotherapy education.

Preface

This book, *Electrotherapy OSPE Checklist and DOPS—A Practical Guide for Physiotherapy Students*, has been carefully curated to support physiotherapy students in mastering the foundational concepts and practical skills in Electrotherapy.

In alignment with the National competency-based education system and also MUHS competency-based education system, the book provides a structured and examination-oriented approach that simplifies learning through clear stepwise procedures, safety instructions, and visual aids. It is specially tailored for first-year BPT students, focusing on machine testing, superficial modality placement, and panel and circuit diagram interpretation for advanced modalities.

How to Use This Book

- Each chapter features a step-wise checklist modeled for practical exams.
- Real panel diagrams of machines are included for better understanding.
- Practical sections reflect real-world examination stations.
- Assess Yourself sections at the end of each chapter are designed to enhance first-year students' understanding and to bridge foundational knowledge with the future clinical application of each electrotherapy modality.
- Scan QR codes to revise using visual demonstration.
- Includes MUHS-format practical marksheet for reference.

MUHS Practical Examination Format (with Case-wise Marks)

Seat no.	Long Case 1: (PWB/HCP/Whirlpool) 25 Marks	Long Case 2: (Ultrasound/Cryo/ Contrast) 25 Marks	Short Case 1: (Low/Med Freq + Panel) 15 Marks	Short Case 2: (High Freq/Actinotherapy + Panel) 15 Marks	Total (/80)
Student 1					
Student 2					
Student 3					

Trupti S Deshmukh
Shruti S Sarkar

Acknowledgments

It gives us immense pleasure to present this book, *Electrotherapy OSPE Checklist and DOPS—A Practical Guide for Physiotherapy Students*. This work is the result of consistent effort, academic insight, and the support of several individuals to whom we are truly grateful.

We extend our heartfelt gratitude to **Dr Pranati Tilak,** Campus Director, TMV, Navi Mumbai Campus, for her continuous encouragement, visionary leadership, and unwavering support throughout this academic journey.

Our sincere thanks to **Dr Pranjal Grover**, Principal and Professor, TMV's Lokmanya Tilak College of Physiotherapy, for his valuable guidance, constructive feedback, and motivation at every stage of this project.

We would like to acknowledge the entire **Electrotherapy Department team**, faculty members, and staff of TMV's Lokmanya Tilak College of Physiotherapy for their cooperation, teamwork, and academic contribution in bringing this book to fruition.

A special note of appreciation to all our **students**, whose enthusiasm for learning and constant curiosity inspired the development of this structured, practical-oriented guide. Their feedback and engagement have been instrumental in shaping the content of this book.

We also appreciate our **interns**, whose enthusiasm, active participation, and valuable inputs played a vital role in shaping the practical framework of this book. Their involvement in content creation, demonstrations, and feedback during pilot sessions has added great depth and clarity to the learning material.

We also wish to thank our **entire families**, whose patience, emotional support, and encouragement have been our strength throughout this academic journey. Last but certainly not least, we express deepest gratitude to our parents, Mrs Shraddha Kulkarni and Dr Sanjeev Kr Sarkar (Dr Trupti S Deshmukh, PT), and Mrs Sukla S Sarkar (Dr Shruti S Sarkar, PT) for their unconditional love, strength, and constant support throughout the academic and professional journey. Their blessings and encouragement have been the foundation.

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We sincerely thank the entire CBS team for bringing out the book with utmost care and attractive presentation. We would like to thank Ms Nitasha Arora (Assistant General Manager – Publishing) for her production support. We would also extend our thanks to Ms Surbhi Gupta (Sr. Editor cum Team Lead), Mr Ashutosh Pathak (Assistant Production Manager cum TL) and all the production team members for devoting laborious hours in editing, designing and typesetting the book.

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The names of the contributors are arranged in alphabetical order.

Special Features of the Book

Learning Objectives in the beginning of every Chapter help readers understand the purpose of the chapter.

LEARNING OBJECTIVES

After the completion of the chapter, the readers will be able to:

- Understand the importance of electrical safety in electrotherapy.
- Develop skills in using testing instruments like multimeter and tester.
- Conduct preuse safety checks on equipment, wires, and electrical mains.
- Identify and describe the functions of basic electrotherapy components.

COMPETENCIES

Code	Competency statement	Miller's level	Domain	Assessment method
C4.1	Explains the physiological effects of moist heat therapy.	Knows	Cognitive	Viva/MCQ
C4.2	Identifies indications and contraindications for hydrocollator packs.	Knows	Cognitive	MCQ/case scenario
C4.3	Prepares and applies hydrocollator pack with appropriate layers.	Shows	Psychomotor	OSPE/direct observation

Competency mapping shows the connection between theoretical knowledge, practical skills, and examinations.

Must Know boxes provide extra information on important facts and terms of the concerned topic.

Must Know

- Do not handle exposed wires.
- Always power off before testing and unplug before connecting or disconnecting wires.
- Use insulated tools only.
- Calibrate devices regularly.
- Ensure proper grounding of all machines before use.
- Never operate equipment with wet hands.

TABLE 3.1: Electrotherapy apparatus with their functions

Apparatus	Description	Function
Tester	Pen with neon bulb	Detects live current
Multimeter	Digital/analog measuring tool	Measures voltage, resistance, continuity
Potentiometer	Variable resistor	Adjusts voltage
Capacitor	Stores electrical charge	For filtering, stimulation
Rheostat	Adjustable resistor	Controls current
Fuse	Safety device	Breaks circuit under overload

Numerous **Tables** have been used in the chapters to facilitate learning in a quick way.

Various **Figures** are added which offer quick insights and aid in conceptual understanding.

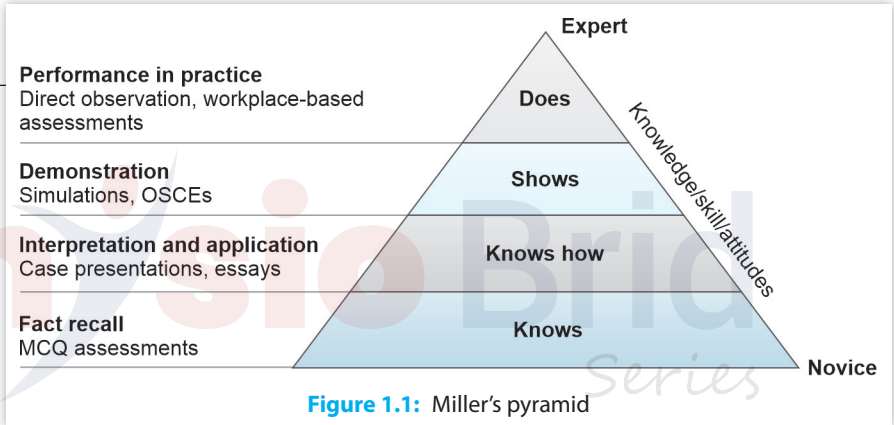

Figure 1.1: Miller's pyramid

STUDENT ASSIGNMENT

SHORT ANSWER QUESTIONS

1. Define iontophoresis.
2. State the principle of iontophoresis.

LONG ANSWER QUESTIONS

1. Explain the principle, procedure, and clinical applications of iontophoresis.
2. Describe the precautions and dangers of iontophoresis.

PRACTICAL/VIVA QUESTIONS

1. What is the principle of iontophoresis?
2. Give two examples of drugs commonly used in iontophoresis and their polarity.

CASE-BASED QUESTION

A 30-year-old male presents with lateral epicondylitis. The physiotherapy intervention includes iontophoresis using dexamethasone (negative polarity) for 15 minutes. After 2 weeks, the patient reports reduction in pain and tenderness.

1. Explain the procedure and safety precautions for applying iontophoresis in lateral epicondylitis.
2. Explain the physiological effects and therapeutic rationale of dexamethasone iontophoresis in reducing pain and inflammation.

Student Assignment sections are included at the end of each chapter to help the students assess their understanding of the discussed topics.

Contents

Section II Superficial Heating and Cooling Modalities

Section III Deep and Acoustic Modalities

Section IV Low and Medium Frequency Currents

6

Whirlpool Therapy

Trupti S Deshmukh

LEARNING OBJECTIVES

After the completion of the chapter, the readers will be able to:

- Understand the therapeutic principles and mechanisms of whirlpool therapy.
- Identify clinical indications, contraindications, and physiological effects.
- Execute the correct OSPE steps for whirlpool therapy application.
- Apply hydrotherapy concepts to physiotherapy clinical practice safely and effectively.

COMPETENCIES

Code	Competency statement	Miller's level	Domain	Assessment method
C6.1	Describe the mechanism and physiological effects of whirlpool therapy.	Knows	Cognitive	Written/oral viva
C6.2	List the indications and contraindications for whirlpool therapy.	Knows	Cognitive	MCQ/short answer
C6.3	Explain the construction and components of a whirlpool therapy unit.	Knows	Cognitive	Viva/label diagram
C6.4	Demonstrate safety checks and patient preparation for whirlpool therapy.	Shows how	Psychomotor	OSPE
C6.5	Select appropriate water temperature and justify the selection based on the clinical condition.	Shows how	Cognitive	OSPE + viva
C6.6	Position the patient correctly for safe and effective whirlpool therapy.	Does	Psychomotor	OSPE
C6.7	Apply whirlpool therapy using correct technique and monitor patient during treatment.	Does	Psychomotor	OSPE
C6.8	Perform post-treatment care including drying, inspection, and cleaning of the tank.	Does	Psychomotor	OSPE
C6.9	Explain the rationale and benefits of whirlpool therapy to the patient.	Shows how	Affective	Role-play/oral explanation
C6.10	Demonstrate infection control measures and hygiene maintenance during and after whirlpool use.	Does	Psychomotor	OSPE

INTRODUCTION

Whirlpool therapy is a hydrotherapy technique in which a body part or the entire body is immersed in a tank of moving warm or cold water. The mechanical agitation combined with thermal effects enhances circulation, relieves pain, and promotes healing—especially for wounds, joint stiffness, and musculoskeletal conditions.

INDICATIONS

Sl. no.	Use/indication
1.	Open wounds, burns, and ulcers (sterile tank)
2.	Muscle spasm and joint stiffness
3.	Chronic arthritis and joint pain
4.	Peripheral circulation issues
5.	Postoperative edema and tissue healing

CONTRAINDICATIONS

Absolute contraindications	Relative contraindications
Open wounds, cuts or skin infections	Poor thermal sensation/neuropathy
Severe peripheral vascular disease (PVD)	Mild edema in treatment area
Active bleeding/hemorrhagic disorders	Hypersensitivity to heat
Acute inflammation	Advanced age or very young patients (fragile skin)
Malignant tumors in treatment area	Cardiovascular compromise (monitor closely)
Thrombophlebitis	Skin conditions like eczema, dermatitis (if mild and localized, monitor)

PHYSIOLOGICAL EFFECTS

Effect	Description
Thermal effect	Warm water increases blood flow, reduces pain, and enhances flexibility.
Mechanical effect	Agitation massages tissues, helps in debridement and loosens exudates.
Analgesic effect	Reduces pain by relaxing muscles and stimulating sensory nerve endings.
Vasodilation/vasoconstriction	Enhances circulation depending on water temperature.
Relaxation and comfort	Overall therapeutic environment enhances patient compliance and comfort.

Mechanism of Pain Relief by Superficial Heat

- **Vasodilation and circulation:**
  - Heat causes vasodilation of superficial blood vessels.
  - This increases local blood flow, bringing more oxygen and nutrients while removing waste metabolites.
  - Improved circulation reduces ischemia and helps tissue healing.

- **Muscle relaxation:**
  - Heat decreases muscle spindle sensitivity and reduces gamma efferent activity, leading to relaxation.
  - This relieves muscle spasm and stiffness.
- **Gate control theory:**
  - Warmth stimulates thermoreceptors, which activate large-diameter sensory fibers (α-β).
  - These fibers inhibit transmission of pain signals at the spinal cord level (gate control), reducing pain perception.
- **Increased tissue extensibility:** Collagen fibers become more extensible at higher temperatures, improving joint range of motion when combined with stretching.
- **Psychological effect:** Heat has a soothing, comforting effect → reduces anxiety and pain awareness.

PANEL DIAGRAM

Labeled illustration of tank with (Fig. 6.1):

- Water level indicator
- Agitator/turbine
- Temperature control
- Overflow outlet and patient seating position

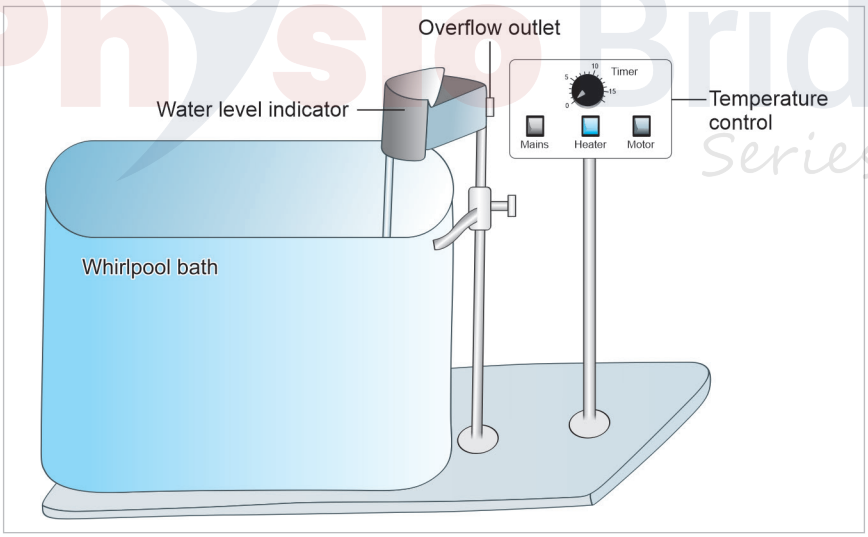

Figure 6.1: Diagram illustrating whirlpool bath

MODALITY AND EQUIPMENT

Whirlpool bath and panel diagram of whirlpool bath are shown in Figures 6.2 and 6.3.

Figure 6.2: Whirlpool bath

Figure 6.3: Panel diagram of whirlpool bath

Must Know

- **Therapeutic water temperature:**
  - **Warm:** 38°–44°C
  - **Cold:** 10°–18°C
- **Duration:** 15–20 minutes
- Tank must be sterile for wounds or burns.
- Always test temperature sensation first.

INFECTION CONTROL AND MAINTENANCE

- **During use:**
  - Check and maintain safe water temperature.
  - Add antiseptic/antimicrobial solution if prescribed (for wound care).
  - Cover wounds with sterile dressing if indicated.
  - Dedicate whirlpool session to one patient only—avoid sharing.
  - Therapist to wear gloves and protective apron.
  - Observe patient for signs of infection (redness, swelling, discharge).
- **After use:**
  - Drain water completely after each session.
  - Scrub tank and turbine with disinfectant.
  - Rinse and dry tank thoroughly.
  - Disinfect or sterilize all removable parts.
  - Dispose of contaminated water per biomedical waste guidelines.
  - Record cleaning/disinfection in maintenance logbook.
- **Infection risks:**
  - Cross-contamination between patients if water not changed.
  - Growth of bacteria/fungi in warm, moist tank environment.
  - Increased risk of wound infection if tank not cleaned properly.
  - Improper PPE use by therapist may spread infection.

OSPE CHECKLIST

Sl. no.	Title	Marks	Time in seconds	Score	Remarks
1.	Greetings to examiner and model, introduction of case	2	10		
2.	Check indication and contraindications	2	15		
3.	Sensory testing (hot/cold discrimination of treatment area)	2	15		
4.	Skin inspection for wounds or infection	2	10		
5.	Comfortable positioning of the patient	1	8		
6.	Explanation of procedure to the patient	2	12		
7.	Set water temperature: • Cold: 10°–18°C • Warm: 38°–44°C	2	12		
8.	Ensure tank hygiene and pre-cleaning of the equipment	2	12		
9.	Switch on agitator/turbine and check for even turbulence	2	12		
10.	Immerse part gently in tank; monitor patient comfort	2	15		
11.	Treatment duration maintained (15–20 minutes)	2	15		
12.	Turn off unit and carefully remove the limb	1	8		
13.	Dry and inspect the skin after treatment	2	12		
14.	Clean tank post-treatment	2	12		
15.	Wind up and replace accessories on trolley	1	12		

Note: Although individual marks are mentioned for each step, during the practical examination a combination of steps/questions will be selected from the checklist to total **25 marks** for the **Long Case 1**. The assessor will **only observe** the steps performed; **no viva** will be conducted.

Date: **Evaluator Signature**

STUDENT ASSIGNMENT

SHORT ANSWER QUESTIONS

1. List any three physiological effects of whirlpool therapy.
2. What precautions should be taken before using a whirlpool tank for wound care?
3. Describe in short the thermal ranges used for cold and warm whirlpool therapy.

LONG ANSWER QUESTIONS

1. Describe the steps of whirlpool therapy application with safety protocols.
2. Explain the mechanical and thermal effects of whirlpool therapy in musculoskeletal rehabilitation.

PRACTICAL/VIVA QUESTIONS

1. What is whirlpool therapy and what is its primary therapeutic purpose?
2. What are the main indications of whirlpool therapy?
3. List any four contraindications for whirlpool therapy.
4. How do you ensure patient safety during whirlpool therapy?
5. How does whirlpool therapy help in wound management?
6. How does turbulence in whirlpool therapy aid rehabilitation?
7. What are the signs of adverse reactions during whirlpool therapy?
8. Why should metal objects be removed before whirlpool therapy?
9. What is the recommended treatment duration for whirlpool therapy?
10. Demonstrate correct patient positioning and limb immersion in a whirlpool bath.

CASE-BASED QUESTION

A 68-year-old diabetic male presents with a nonhealing ulcer on the foot following a partial amputation. The physiotherapy intervention includes whirlpool therapy using a sterile foot tank maintained at 38°C for 15 minutes. After 3 weeks of regular treatment, the patient shows improved circulation, reduction in slough, and decreased pain.

1. Explain the procedure and infection control precautions for administering whirlpool therapy in a diabetic patient with a foot ulcer.
2. Explain the therapeutic effects and rationale for using hydrotherapy in wound healing and pain reduction.
3. Explain the postprocedure care and patient education required to ensure safety and promote continued recovery.

ELECTROTHERAPY

OSPE Checklist and DOPS

A Practical Guide for Physiotherapy Students

Salient Features

- **Competency-Driven Chapter Design:** Each chapter is structured around clearly defined, assessable competencies aligned with Miller's Pyramid, ensuring outcome-based learning.
- **OSPE-Ready Procedural Checklists:** Examination-oriented procedural checklists are seamlessly integrated, allowing direct adoption for undergraduate practical assessments.
- **Uniform Safety and Equipment Protocols**: A standardized safety framework—including electrical testing, leakage checks, and shutdown procedures—is applied consistently across all modalities.
- **Visual–Digital Learning Support:** Each chapter features well-labeled panel diagrams and real clinical images, besides 16 procedural videos accessible *via* QR codes at the beginning of the book, enabling comprehensive multimodal learning and enhanced practical understanding.
- **NCAHP-Aligned Curriculum:** Each chapter is developed in accordance with the BPT curriculum of the NCAHP, emphasizing measurable competencies and graduate attributes.
- **Clinically Contextualized Case Integration:** Relevant clinical scenarios are incorporated into every chapter to support the application of electrotherapy modalities in common musculoskeletal and neurological practice settings.

About the Authors

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