Learning Objectives

MedBridge Education

Applying Electrical Stimulation in Your Physical Therapy Practice

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Chapter 1: Principles of Electrical Stimulation

The online learners will

- Explain the physiological properties of excitable tissue (nerve, muscle)
- Describe the electrical characteristics of waveforms
- Identify the similarities and differences between the electrical characteristics of waveform for direct, alternating, and pulsed current.
- Identify the waveform capabilities of selected electrotherapeutic devices
- Relate the characteristics of waveform to the stimulation of excitable tissue
- Determine the optimal waveform requirements for selected clinical applications and outcomes
- Identify requirements for electrode materials
- Explain safety considerations when using electrical currents therapeutically.

Chapter 2: Electrical Stimulation for Pain Management

The online learners will

- Explain the theoretical bases for the management of pain with transcutaneous electrical (nerve) stimulation (TENS)
- Interpret the current evidence base regarding clinical indications for the use of TENS for electroanalgesia
- Explain the conflicting outcomes in the current evidence, including the limitations and implications.
- Determine the electrical stimulus, waveform, device, and electrode requirements for application of electrical stimulation for pain management
- Identify the similarities and differences between modes of stimulation related to clinical outcomes
- Demonstrate elements of application of electrical stimulation for pain control:
  - Application of electrodes
  - Selection of device and stimulus settings: custom settings v. preset protocols
  - Schedule of treatment – duration of single treatment, frequency of single treatment, and over what time period treatments may be extended
- Choose appropriate outcomes measures that clarify changes in function, not simply changes in pain ratings
- Identify contraindications and precautions to the use of transcutaneous electrical stimulation
- Integrate the use of electrical stimulation for pain control into a comprehensive physical therapy plan of care
Chapter 3a-c: Neuromuscular Electrical Stimulation (NMES) for Strengthening Muscle and Enhanced Motor Control

The online learners will

- Define neuromuscular electrical stimulation (NMES).
- Identify the similarities and differences between NMES with functional electrical stimulation (FES).
- Identify clinical indications for NMES and FES, based upon desired outcomes of electrotherapeutic treatment.
- Define the differences between voluntary excitation and electrically-induced excitation of skeletal muscle and the implications for treatment with NMES.
- Describe the elements of implementing a treatment with NMES
  - Electrode type and placement
  - Waveform options
  - Stimulus settings for achieving adequate dose of stimulus
- Present the evidence for selected clinical applications of NMES
- Explain general considerations for implementing a clinical treatment program that includes NMES and the special considerations for pediatric clients.
- Critique selected evidence for the application of NMES in two case examples (below)
- Utilize this evidence in development of a treatment program including NMES for two case examples:
  - NMES for quadriceps retraining and strengthening following total knee arthroplasty
  - FES to facilitate dorsiflexion during gait in patients with hemiplegia following stroke.
- Demonstrate these applications.