Electrotherapy

Course No: 295.2119.A.01/02/03
Semester: Full , Year: 2015-2016
Course Level: BA , Course Year: 2
Number of credits: 2
Course type: lecture and laboratory
Hours every week: 4
Course Lecturer: Prof. Yocheved Laufer
Contact details: By appointment via e-mail: yochy.laufer@gmail.com
Course assistants: Ms. Miri Lahav
Prerequisites: Physics: Electricity And Biomechanics.

Course overview:

Treatment modalities to be presented during the course (such as electrical stimuli and biofeedback) are part of a variety of means and techniques available to the physical therapist when dealing with movement impairments. In order to select an optimal treatment method, the therapist must understand the pathophysiological processes pertaining to the patient's problems as well as the physiological effects of the treatment method in question, and be able to adjust treatment to the patient's needs in a safe and effective manner. The course will include lectures combined with lab classes. Strong emphasis will be put on application of acquired knowledge in clinical problem solving. Treatment modalities emphasized in the course are: TENS, characteristics of low-frequency motor stimulation, "Russian" current, interferential current, HVGS, diadynamic current, EMG and biofeedback.

Course aims:
At the conclusion of the course the student will:

- Understand the impact of altering various stimulation parameters on sensation threshold, force of contraction, and muscle fatigue according to current literature.
- Be able to evaluate and document the effect of various stimulation parameters on sensation, force of contraction, and muscle fatigue in various clinical conditions.
Understand the physiological impacts of various stimulation and feedback devices on pain, force development, blood flow, spasticity, swelling, and muscle re-education.

Be familiar with the principles of using electrical stimulation for functional means in various clinical conditions (FES).

Be familiar with the advantages and disadvantages of each of the studied devices.

Be familiar with treatment indications, contraindications, and precautions during treatment.

Be able to match optimal treatment (type, dosage, technique) to the patient's problem in accordance with existing knowledge in professional literature (EBP).

Be able to describe to the patient the sensations, advantages and side effects which may accompany therapy.

Be able to perform the various treatment techniques in a safe, efficient way.

Be able to evaluate treatment outcomes and report them orally and in writing.

Have experience in presenting orally and in writing the outcomes of a clinical experiment exploring the effect of stimulation parameters on sensation threshold, motor contraction and muscle fatigue.

Course subjects

I. Introduction

- Parameters of electrical stimulation (pulse parameters, impact of various characteristics on sensory and motor response)
- General instructions.

II. Physiological effects of electrical stimulation

- Pain relief
- Muscle strengthening (strength, endurance)
- Spasticity reduction
- Motor learning
- FES
- Swelling reduction
- Blood flow increase
- Drug delivery
- Denervated muscle

III. Types of currents in therapeutic use

- TENS (sensory, motor)
- "Russian" current
- Interferential current
- HVGS
- Diadynamic current
### IV. Bio-Feedback

#### Course outline (by weeks):

<table>
<thead>
<tr>
<th>Week</th>
<th>Time</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mon: Lecture 12:15-15:45</td>
<td>Introduction, current and pulse characteristics</td>
</tr>
<tr>
<td>2</td>
<td>Mon: Lecture 12:15-15:45</td>
<td>TENS, characteristic and general application</td>
</tr>
</tbody>
</table>
| 3    | Sun Lecture Mon: Lab  
Group 1 14:15-15:45  
Gr. 2 14:15-15:45 | TENs and pain modulation  
TENS |
| 4    | Sun. lecture Mon: Lab  
Group 1 14:15-15:45  
Gr. 2 14:15-15:45 | NMES pulse characteristics, central activation, |
| 5    | Sun. lecture Mon: Lab  
Group 1 14:15-15:45  
Gr. 2 14:15-15:45 | NMES cont. |
| 6    | Sun. lecture Mon: Lab  
Group 1 14:15-15:45  
Gr. 2 14:15-15:45 | NMES strength and endurance |
| 7    | Practical Exam 1 | Sensory stimulation for pain modulation |
| 8    | Sun. lecture Mon: Lab  
Group 1 14:15-15:45  
Gr. 2 14:15-15:45 | Biofeedback |
| 9    | Chanuka vacation Mon: Lab  
Group 1 14:15-15:45  
Gr. 2 14:15-15:45 | Review lab |
Course requirements and student's evaluation:
Course grade components:
1. Two practical exam—20% of grade
2. Written exam—65% of grade
3. Exercise – 15% of grade (detailed instructions will be provided later on)

Requirements:
- Compulsory attendance in all labs (see below: instructions work in the lab).
- A passing grade in each of the following:
  - Practical exam: passing grade is 70%
  - Written exam: passing grade is 60%
  - Exerciser: passing grade is 60%
- Course passing grade is 60%

Instructions for work in the lab:
Within the framework of lab classes, the student will be familiarized with a variety of equipment used in electrotherapy, and will practice operating the equipment in a safe and efficient manner.
Lab objectives:
- Development of skillful usage techniques for each of the devices studied in course. Such skills include: patient assessment and preparation for treatment; determination of treatment dosage; preparation of equipment and its operation in a safe and efficient manner; and performance of required actions after treatment conclusion.
- Observation and study of local and overall effects of the various treatment devices.
- Development of clinical reasoning for problem solving.
- Experience (sensation) of each of the studied treatment techniques.

Instructions for the lab:
- The lab will include "treatments" by all devices studied in course, performed by students on one another. Thus it is mandatory to attend all labs in suitable attire, allowing treatment of all body parts.
- Each student must undergo at least one full treatment by each of the devices.

Care of equipment:
- The student is responsible for checking the intactness of devices in use.
- At the conclusion of treatment, it is the student’s responsibility to clean the equipment and treatment area.
- At the end of class, it is the student’s responsibility to return the equipment to its place. The student must make sure that the device is reset and that electrical wires are rolled back into place.
- Improper behavior will result in reduction of the final grade.

Reading material:

Primary Textbooks

Internet site
1. http://www.electrotherapy.org/

Articles
1-18


12. Laufer Y, Elboim M. Effect of burst frequency and duration of kilohertz-frequency alternating currents and of low-frequency pulsed currents on strength of contraction, muscle fatigue, and perceived discomfort. Phys Ther 2008;88(10):1167-76.


*Changes may occur; messages will be posted, if necessary, during the semester*