A COMPARISON OF LEARNING ACQUISITION FROM A VIDEOTAPED AND TEACHER PRESENTED LECTURE-DEMONSTRATION TEACHING MODULE

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Date

To the Provost of the Graduate School:

I am submitting herewith a thesis written by Barbara Woodall entitled "A Comparison of Learning Aquisition From a Videotaped and Teacher Presented Lecture-Demonstration Teaching Module." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Health Sciences Instruction.

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DEDICATION

to

my parents

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The acquisition of learning from a video-taped lecture-demonstration was compared to that of the same teacher presented lecture-demonstration. Twenty-six senior physical therapy students took an investigator-made pretest, heard the one hour lecture-demonstration, and immediately took a posttest. Alternate test forms were used. Four months later, the same students took a second posttest to determine retention of material learned. The mean scores of 2 groups were compared from pretest to posttest 1, pretest to posttest 2, and posttest 1 to posttest 2 differences. There was gain in knowledge acquired from the pretest to posttest 1. There was a loss of this gain over time; the mean scores of posttest 2 were very close to those of the pretest. There

was no significant difference between the 2 groups for any of the comparisons using the *t* test. Videotapes can be an acceptable alternative to teacher presented lecture demonstration for a preselected physical therapy topic.

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CHAPTER 1

INTRODUCTION

Videotaped educational material is nothing new to most educators in this day and age. Most children have grown up watching the television, and are very familiar with filmed information. Educators in the elementary and high schools and even in the colleges and universities have used filmed information to supplement and sometimes replace their lectures.

Some educators have studied the learning preferences of students at all levels of live versus videotaped educational material. Studies have even been done within the medical realm on such learning preferences. Color film, sound, content, and length of educational films have also been subjected to study. Discussions of the cost versus merit of educational videotapes have been documented sparsely.

Statement of the Problem

Learning acquisition from a videotaped lecture-demonstration of a predetermined physical therapy topic was unknown. A lecture-demonstration was developed (The

Evaluation and Treatment of Thoracic Outlet Syndrome) and videotaped. The scores of senior physical therapy students who observed the videotaped versus the teacher presented lecture-demonstration were analyzed. This study attempted to answer the question: Is videotaped instruction an acceptable alternative method to teacher presented classroom instruction when teaching a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome) to physical therapy students prior to clinical affiliations?

Statement of the Purposes

There were several purposes for this study. The first was to develop a videotape of a teaching module of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome). The second was to test for acquisition of knowledge of the students completing the videotaped teaching module and of the students completing the teacher presented classroom method of instruction. The third was to aid in the determination whether videotaped teaching modules are an acceptable alternative to teacher presented classroom instruction. The last was to test for retention of learning after 4 months of clinical affiliations.

Hypotheses

For this study the hypotheses were:

1. There is no statistically significant difference between the mean scores of the pretest and posttest 1 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome).
2. There is no statistically significant difference between the mean scores of the pretest and posttest 2 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome).
3. There is no statistically significant difference between the mean scores of posttest 1 and posttest 2 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome).

Definition of Terms

For this study the following operational definitions were used.

Videotaped Instruction. Imparting information of a preselected topic by use of hardware and software associated with playback and production of magnetic audiovisual cassette tapes. These tapes are displayed on a television monitor by use of an automatic cassette deck.

Videotaped Teaching Module. The preselected topic and method of teaching that is recorded on cassette tapes. In this study the topic is a specified physical therapy evaluation and treatment of a particular orthopedic diagnosis (Thoracic Outlet Syndrome) and is presented in the lecture-demonstration method.

Classroom Instruction. A method of lecture-demonstration presented by the teacher to a group of students to impart knowledge on a preselected topic.

Preselected Physical Therapy Topic. A topic chosen by the teacher to be presented to students either in the classroom or by videotaped instruction.

Affiliations. A period of 5 to 8 weeks spent in three different preselected clinics for the purpose of practicing clinical skills on patients. All didactic work has been completed.

Gain Scores. The knowledge scores obtained by subtracting the mean scores of posttests from mean scores of pretests or posttest 1 mean scores from posttest 2 mean scores.

Short Term Cognitive Gain. Knowledge gain immediately after the posttest.

Long Term Cognitive Gain. Knowledge gain four months after the posttest.

Learning Acquisition. Any increase in gain scores.

Assumptions

Eight assumptions were made for this study.

1. All participants in the study were senior physical therapy students who have been previously exposed to the content material in the program of education.
2. All participants in the study had equivalent didactic experience.
3. All participants had successfully completed all didactic work encountered to this point in an accredited program of physical therapy.
4. The videotape presented the lecture-demonstration in a realistic manner.
5. All participants were able to see and hear the videotape clearly.
6. The instructor requested that no discussion or clarification occur during the classroom instruction or videotaped instruction until the posttests were completed.

7. Content validity of the pretest and posttests was established by experts.
8. Environmental factors of the classroom used for both types of instruction were similar.

Limitations

The results of this study were evaluated within the following limitations:

1. The sample was limited to senior physical therapy students of a metroplex school of physical therapy who were ready to embark on clinical affiliations.
2. The control and experimental teaching study was administered toward the end of the spring semester, 1986, and 4 months later the second posttest was given.
3. Each class was composed of a different set of participants who may have different learning preferences.
4. Each participant differed in the ability to take examinations.
5. Each participant differed in retention of material learned in the school educational program.
6. All participants taking the final posttest did not have identical affiliations.
7. Prior videotape experience might have affected the participants' learning.

8. Item analysis and reliability of the pretest and posttests were unknown.
9. The pilot study was limited to 14 subjects.

Significance of the Study

With the onset of an increased age of students at the university and professional level, it is apparent that their learning must be varied and allow methods for independent study in addition to conventional methods. One such method found in the literature was the use of videotaped information used alone or in conjunction with classroom teaching. Many videotapes made professionally or by clinicians or educators at the amateur level have been made and distributed in this state. Often these were quite expensive to rent or make. Little research has been done to support that student physical therapists actually learn from these tapes.

This study was done in an attempt to promote research in education of physical therapy students, especially in the area of videotaped instruction. This study may have helped by indicating that physical therapy students learn as well by videotaped instruction without decreasing quality of the education. This, in turn, would increase productivity and free time of educators to allow them one-on-one review

or instruction with individual students, or to develop further information or lectures.

Some schools of physical therapy have used videotapes to supplement other teaching methods; little was known about student learning from these tapes. It seems unwise to utilize expensive tapes until learning has been documented in this area for physical therapy students.

It is hoped that this study contributed to the documentation that physical therapy students do, in fact, learn as well from a videotaped lecture-demonstration as they do from a teacher presented lecture-demonstration. This study explored the learning acquistion of these two methods of presentation on a senior physical therapy class prior to their clinical affiliations. It further attempted to document whether the students retained this material after 4 months of clinical affiliations. The findings of this study may indicate other studies needed to determine learning or benefit of the use of videotaped inservices for staff physical therapists or for student affiliates in the clinic.

Summary

Education is time consuming and therefore costly when a teacher presented classroom instruction method is utilized. Videotaped instruction appeared to be a good alternative

method for instruction for physical therapy students. The problem of videotaped instruction as an alternative method to classroom instruction for student physical therapists just prior to clinical affiliations was studied on the premises of a metroplex campus of an accredited school of physical therapy.

CHAPTER II

REVIEW OF LITERATURE

In this chapter, five topics are discussed that are relevant to this study: the adult learner, learning preferences of allied health students, videotaped versus teacher presented lectures, construction of educational videtapes, and evaluation by pretests and posttests for learning acquisition. Much information can be found in the educational and psychological field on the theories of learning and the adult learner. Several studies have been done in the medical field on the learning preferences of allied health students. Less material is available on the construction of educational videotapes and the evaluation by pretests and posttests. This literature reviews studies done in each of these areas.

The Adult Learner

Several different learning theories have evolved in the educational and psychological fields over the years. Thorndike proposed the connectionism, or, trial and error learning theory. He felt connections of learning were strengthened by the result of the consequences, and that

both the teacher and the learner should be clear about what was to be learned (Bower & Hilgard, 1981; Thorndike, 1927, 1965, 1969). Pavlov believed learning occured as a result of conditioned stimuli, and that similar stimuli would elicit this response (Lovell, 1980; Pavlov, 1928, 1957). Skinner proposed operant conditioning, and felt that variable intervals of stimuli brought about increased and longer lasting responses (Bower & Hilgard, 1981; Ferster & Skinner, 1957; Skinner, 1938). The Gestaltists believed learning occured by categorization of perceptions of the environment (Lovell, 1980).

Piaget linked biological maturation with environment experience; he felt learners fit new material into previously learned and stored information (Lovell, 1980; Piaget and Inhelder, 1973). The theory of functionalism states that learning occurs as a response to a problem. Motivation to solve the problem is the core of this theory; it is also believed this motivation increases with age (Bower & Hilgard, 1981).

Many of the learning theories were studied in animals or children. Later, information about adult learning began to emerge. Most authors agree that learning slows with age, and that peak learning occurs in the juvenile years. However, older learners are quite capable if the approach

is suitable. Adult learning is influenced by many factors such as age, personality, socio-economical status, previous educational experience, motivation to learn, and learning preference (Lovell, 1980; Zemke & Zemke, 1982). Lovell and the Zemkes suggested that teachers insure adults learn by selecting and presenting material in a way the learner can relate to previously learned ideas.

Cattell (1963) defined fluid and crystallized intelligence. Fluid intelligence is based on inborn ability to form concepts and do abstract reasoning. This type of intelligence appears to decrease after age twenty. Crystallized intelligence involves mixing fluid intelligence with knowledge of culture. This type mixes life experiences and formal education and thus increases with age.

Some studies have also been done on adult learners to support convergent and divergent thought. Convergent thought is more concrete and logical; divergent thought occurs in different directions and is more abstract. It was found that students of science preferred convergent thought (Lovell, 1980).

Individual differences in age and self perception affect adult learning. As we know, Maslow emphasized five basic needs ranging from physiological to self actualization. These are involved with a need to obtain knowledge and

understanding. This, in turn, motivates the adult learner (Maslow, 1943).

Knowles (1984) proposed the theory of androgony, or adult learning. He felt adult learners were goal, activity or learning oriented. In other words, adults learn to attain goals, for social contact, or to seek knowledge for its own sake. This theory is based on the assumption that adults have increased experiences and resources for learning, that adults become increasingly self directed, and that readiness to learn becomes a product of a need to perform social roles. The learner was motivated to achieve job or social goals, had a problem centered orientation to learning, and wanted to apply what is learned (Knowles, 1984). Zemke and Zemke felt that adults often seek learning experiences as "life-change events occur in their lives. . . and the more events that occur, the more he or she seeks out learning opportunities" (1981, p. 115). They proposed that adults need to integrate what they learn, and will learn more slowly if the information conflicts with previously learned material. Sewall (1984) found that the mean age of adult learners has increased and that they often return to school to foster a new career, or to have an improved sense of accomplishment. Job satisfaction, encouragement from family

or friends, and available funds ranked the highest as reasons for returning to classes.

Adults also had several barriers to overcome. These included family and work responsibilities, cost of education, course time schedules and time away from work, and self perceptions such as fear of failure of being too old to learn (Cross, 1981). Richter and Whitten (1984) found that one of the most difficult barriers for adults is lack of time. Loevinger (1976), a developmentalist, proposed that learning was related to the developmental stages each person undergoes. During the ages of the late 20s and early 30s the adult went through periods of transition and introspection before settling down. It was often during these times that the adult returned to school or changed careers (Lasker and Moore, 1980; Loevinger, 1976).

Learning Preferences of Allied Health Students

Students in medicine and allied health could be classified as adult learners. Certainly they have had previous learning experiences and are involved in formal higher education. Many education and psychology studies have been done to determine learning preferences of children and teenagers, but only a few have been done to determine learning preferences in medical and allied health students.

Rezler and French (1975) developed a Learning Preference Inventory and attempted to determine learning preferences of six groups of allied health students. They discovered that the overall preferences were concrete and teacher-structured. This was particularly true for physical therapy students. Concrete meant specific, practical tasks, and teacher-structured referred to a well-organized, teacher-directed class with goals clearly identified. Payton, Hueter, & McDonald (1979) found that physical therapy students in the United States preferred courses that were logical and clearly organized. Another study done over a three year period supports these findings (Vittetoe & Hooker, 1983).

A study done in the dental field found that dental hygiene students were accommodators and divergers. This meant they preferred concrete experiences presented in a step-by-step manner (Carrier, Newell & Lange, 1982). It was also found that family physician residents preferred concrete and active learning (Sadler, Plovnick & Snope, 1978). Learning preferences of medical technologists were compared to those of physical therapists, and again, physical therapists preferred concrete and teacher-structured methods. Overall, both groups like this style. They wished to learn what was practical and would be directly job related. They wanted the teacher to be organized and deliver

the learning goals at the onset of the course (Vittetoe, 1983). Even post-graduate allied health professionals attending continuing education courses preferred a structured, ordered, teacher centered approach (Conti and Welborn, 1986). From these studies, it appeared that goal directed traditional lecture-demonstrations based on specific course objectives would be well received by physical therapy students.

Videotaped Versus Lecture Instructions

Lecture is a teacher structured, organized method of instruction. It is usually on a pre-selected topic and often based on objectives. Information can be given in a concrete manner. Students can be given course objectives and thus be aware of instructional goals. As evidenced by learner preferences in allied health, this approach should work well for physical therapy students.

Studies have been done in the field of nursing regarding the use of live lecture with visuals and video instruction strategies. Ostmoe, Van Hoozer, Sheffell, & Crowell (1984) found that nursing students prefer lecture augmented with demonstration, course syllabus, films and readings. The study also compared the characteristics of both teaching methods and found them to be similar. Each involved indirect

participation, had color stimuli and multi-sensory input, was teacher directed, and revealed information step-by-step. In addition, video content could be repeated easily by the student, and material could be magnified or condensed.

Van Mondfrans, Sorenson and Reed (1972) studied acquisition of learning of live lecture as compared to videotapes. No significant difference in test scores was found. The faculty felt the tapes left time for developing supplementary material and individual time with the students.

Studies have been done with medical students also. Videotaped instruction was found to provide quality education in topics where the supply of expert teachers is limited. No difference existed in mean scores of tests between live lecture and videotaped lecture groups (Sox, Marton, Higgins & Hickam, 1984). A study of fourth year medical students supported that videotaped instruction of the physical examination was an effective teaching method (Beswick, Cooper, & Whetlan, 1982). Kaufman and Kaufman (1983) also support this in the subject of clinical neurology. Praegle, Wilkinson and Donnelly (1980) again found no significant difference in learning from lectures or videotaped lectures. This supported the idea that medical information could be taught by color videotape with no decrease in short-term retention. The student, however, preferred lectures over

tapes. Powers and Russell (1980) investigated measures of cognitive factors related to lecture versus videotaped instruction. They found statistical significance to favor the lecture method.

Three investigators ran a content evaluation on videotapes used to instruct second year medical students in anesthesia techniques. They found the tapes with supplemental material transmitted factual information denoted by predetermined standards. Advantages of tapes included preventing patients from being exposed to novices, providing indentical learning experiences, and providing an expert example which the student could model (Warwick & Ravin, 1975).

The preferences of various students in the medical field were discussed. Several studies related to this topic were found, but few studies specific only to physical therapy students have been found by this investigator.

Construction of Videotapes

There are several key concepts to consider when constructing tapes. These include: the script, rehearsal, filming, and of course the cost involved.

A script must be written prior to filming any material, especially educational modules. Proper planning based on established objectives prevented costly errors, a poor

production, and lack of intended information. (McQuillin, 1983). It was best to keep it tight and written with the objectives clearly in mind (Ingrisano, 1985). The script was distributed to the actors, the director and to the camera crew. For this reason it had to be legible and included a large margin for production comments such as camera angle or the actor's position. Often a story board, or a large visual version of the script was suggested with educational or corporate filming (McQuillin, 1983).

Rehearsal was an important area to include in the production of videotapes of films. All key persons had to be familiar with the script and have practiced their respective jobs prior to the taping of the final copy. This became more involved when actors were involved for they had to practice their roles or dialogue.

Filming a videotape was not considered simple. During this time such production elements as lighting, sound, and camera angle arose.

Lighting was deemed one of the most critical elements according to Efrein. It served both a technical and artistic element. Either indirect or spotlights were suggested. If indirect, or basic, light was used, the camera delivered a gray range of image. Even a single spotlight was said to sharpen the image and highlight the subject. Sets were

often lit by spotlights. Two spotlights were placed to cross beams and cover the entire set. In some cases more spotlights with larger or smaller beams were suggested (Efrein, 1979). The best inside lights included quartz or tungsten-halogen. An evenly lit environment gave a clearer video. Light intensity and wattage were important also. The higher the wattage, the higher the intensity. It was deemed important to consider how close the lights were to the subject and each other when deciding the wattage. Proper use of the iris of the camera also changed the overall light intensity. Fluorescent lighting was avoided when possible (Mattingly, 1979). Some sources felt the best lighting was from three sources; a key light, a back light and a fill light. The key light was placed in front or to the left or right of the subject. The back light was behind the subject opposite the camera, and the fill light was at a 45-degree angle to the subject (Coffelt & Combs, 1981; Lanzendorf, 1983).

Color choices played an important part in the success of the videotape. Warm colors appeared nearer and larger than cool colors. It was recommended that brunettes wear medium gray or dark blue, blondes a beige or dark blue, and redheads light pinks or medium gray to dark blue. Rose and pink were flattering for white or gray hair (Mattingly,

1979). Use of the Kelvin color temperature scale was suggested in videotaping since video cameras are more sensitive to color changes than the eye. It was thought helpful to set up the color monitor and check the color image before taping (Cheshire, 1982). The color hue and saturation were of most concern when dealing in color tapes. Conservative dress was suggested (Coffelt & Combs, 1981).

Picture composition was another area to consider when filming a videotape. This meant the balance of the subject with the surroundings and within the picture frame. Camera angle, colors used and whether the lens was close or farther away from the subject affected the composition. Tight frames had a strong impact. Frames look cramped if there was no headroom for the subject. In framing these shots the usual centering was not recommended in every case. "On more formal occasions when someone is speaking directly into the camera, centering can be most effective" (Millerson, 1983, p. 68).

Demonstrations were considered difficult to film and required more exacting camera work. Close shots had to be well organized. Often narrow lense angles or zoom lenses were used. It was important to watch for distractions that could enter the picture (Millerson, 1983).

Sound was another important area in filming a videotape. With 3/4-inch tape, good recording was considered possible due to the audio range available with this type of tape. In fact, 3/4-inch cassette was standard for most educational and industrial settings (Coffelt & Combs, 1981). The most common problem with taping was noise, or the high frequencey hiss heard. It was felt most videotape recorders have a meter which prevents overloading the sound during recording. This meter was calibrated in decibels and indicated a zone to stay within (Cheshire, 1982).

Several microphones to use with videotaping were discussed. The most common was the built-in type which is omnidirectional. This was thought to be less desirable since it picked up all noises associated with the use of the camera as well as any room noise. Directional microphones were preferred (Cheshire, 1982). The microphone may be mounted on a boom, a stand, held in the hand or the lavalier type may be used. A mounted one was preferred if the speaker moved around for demonstrations or to emphasize points (Coffelt & Combs, 1981).

Cost was a concern when making a videotape. Videotapes were considered relatively low cost, were used repeatedly, could be erased and reused, and thus they were cost effective. It was emphasized that other media such as slides or charts

could be incorporated into the videotape also (Kay & Kay, 1983). Was it worth the price of the equipment, the studio or room and all the preparatory work involved? "Producing a quality, cost-effective videotape is 90% planning and organization and 10% execution" (Ingrisano, 1985). It was said that a clear set of objectives and specific checklist to work by were imperative. Video was not considered appropriate for large audiences but worked well with small groups or one-to-one (Ingrisano, 1985). It was particularly effective when needed for frequent training or review sessions, thus allowing the maker to save the time used on multiple live sessions. (Dravnov, Moore, & Hickey, 1980). "Videotape still seems best suited for shooting and editing simultaneously" (McPheeters, 1978, p. 174).

Large corporations often budgeted as much as $1.5 million for the production of training and sales videotapes. This saves them the pay used previously for numerous training personnel or promotional people to travel nationally and present live sessions. This has been successful in some corporations since the mid-seventies. This same approach has been used successfully in the medical field to distribute information on medical conferences or seminars to persons unable to attend, thus saving the physicians or medical personnel several thousand dollars loss when having

to close an office to attend the seminar (Dravnov, Moore, & Hickey, 1980).

Reider (1984) found that video equipment could be purchased for as little as $500.00 and the tapes for as little as $10.00. When this cost was compared to the average instructor's salary at the university level per hour of preparation time and delivery time for a lecture topic, the savings mounted up. However, Miller and Smith (1977), gave the cost per station for videotape hardware around $1800.00, and locally produced tapes cost up to $.60 per minute to run. They did go on to say "Although the video approach costs about 10 times as much as filmstrip, it may be worth 10 times as much to you . . ." (Miller & Smith, 1977, p. 23).

Based on telephone interviews with directors of two metroplex area medical university film studios in August, 1986, the following taping prices were given for university affiliated persons: to use the studio for a set up of lights, a single camera, with the videotape supplied by the speaker the fees ranged from $100.00 to $110.00 per "real time" hour. This meant that both the sound and visual were taped in a single session without further editing needed. Set up fees alone ranged from $35.00 to $75.00 and are figured into the above total fees. If the one hour 3/4-inch

color videotape was supplied by the studio, this was an additional $39.00. These tapes could be purchased by the speaker directly on the market for as little as $26.00. Some university studios supplied a mini-camera which was portable and which could be brought to the location of choice. The price for this was about $100.00 per hour for the one-time situation. Prices increased approximately $25.00 to $50.00 per hour for persons not affiliated with the university (Telephone interview, Bullock; Kazemzadeh 1986).

Based on a telephone interview with Mr. Luke of Video Systems in August, 1986, the following sales prices were quoted on name-brand color videotape equipment: 3/4 inch video color camera with zoom lens and electronic viewfinder, $1900.00; a 209-inch color monitor, $645.00; a color camera with electronic viewfinder and zoom lens with automatic focus, $1100.00; an adaptor to connect the camera with the recorder, $65.00. The total of these prices was $3710.00.

The average cost to copy a videotape if the bank tape was provided was $15.00 per hour (Telephone interview, Kazemzadeh, 1986). Gilkey (1986) felt the average 3/4-inch color videotape had a life span of 100 playings before it needed replacing.

The disadvantages of videotape were the necessity of equipment for showing tapes, the lifespan and storage of the tapes, the need for the studios or portable camera crew, and the time involved in developing the script and filming the information (Kay and Kay, 1983). Gilkey (1986) proposes that 16 milimeter film was as effective and less expensive to use than videotapes.

Evaluation

Content validity refers to whether the test content parallels the instructional objectives in content (Hopkins, & Stanley, 1981). Another definition is

> . . . the behavior and subject matter called for in the items correspond to the behavior and subject matter identified in the specific objective. (Sax, 1980, p. 291)

In standardized achievement tests this process has been done and is supported by statistics (Hopkins & Stanley, 1981). Teacher-made tests should also be analyzed for content validity. Such questions as whether all important topics are included and whether all levels of cognitive knowledge and applications intended are included should be investigated (Hopkins & Stanley, 1981). "Content validity is relevant . . . for psychological, psychomotor, and behavioral measures as well" (Hopkins & Stanley, 1981, p. 81). It is directly related to test bias; if the test is

not valid, bias occurs (Berk, Ed., 1982).

One method for determining content validity is to have two different groups of qualified people make the test using the same criteria and objectives. These would then be administered to a group of students, and correlation statistics run on the test scores (Cronbach, 1981; Sax, 1980). This is time consuming and not often practical. Usually the teacher or investigator asks peers to critique the test (Sax, 1980).

Evaluation of pretests and posttests is often done for both validity of the test and for reliability. Validity will be discussed here. Many pretests and posttests are identical in content and structure. Multiple choice questions are frequently used. These may be reordered to the posttest. Content validity is the most frequently used method to evaluate pretest and posttests. The tests are usually made by the instructor or investigator, and thus must be screened to see if they match the stated teaching objectives for the material presented. The most commonly found method in the literature for determining content validity was to have a chosen panel of "experts" in the field review the objectives and compare these to the content of the pretest and posttest. If the content did not match, the panel recommended changes to the investor (Darr et al,

1979; Huckabay, 1978; Mendel & Scheetz, 1982; Papenfuss, & Beier, 1984; Silvestri, Cohen, & Singh, 1979; Soflin, Young & Clayton, 1977; Witte, et al., 1980).

Studies support that gain scores from investigations can have high reliability (Sharma, Gupta, 1985-86; Zimmerman & Williams, 1982). Investigators have even checked into the realiability of pretest scores and found that a regression effect can create an illusion of gain between the posttest and pretest (Yap, 1978). One set of investigators ran a pilot study and did an item analysis on the pretest and posttest questions for a decision on reliability (Darr, Self, Ryan, Vanderbush, & Boswell, 1981). Others have used statistical analysis of variance and correlation coefficient to determine realiability of their tests (Huckabay, 1978; Mendel & Sheetz, 1982; Papenfuss, & Beier, 1984).

Determining gain scores has been done by the paired or independent student t-test in most literature found by this investigator (Darr et al., 1981; Huckabay, 1984; Soflin et al., 1977). One investigator felt that the analysis of covariance with the pretest score serving as a covariant was the better method to analyze gain scores (Bennet, 1983).

Evaluation should also be done on any videotape used as a teaching tool or in conjunction with pretests and posttests. One method to validate the videotape for quality

and completeness is to have the learners who view the videotape critique it on a pre-prepared questionnaire (Mir, Marshall, Evans, Dannatt, Hall & Duthie, 1985). Another method is to interview the audience after viewing the film; one person questions and another records the answers. Experts can also be asked to critique the videotape for content validity, quality and technical features (Caulley & Douglas, 1985). Lastly, "a posttest control group design study can be conducted to determine whether the videotape delivers the instructional content" (Caulley & Douglas, 1985, p. 33).

In any case, the videotape should be evaluated for content as compared to the content objectives, technical features such as sound, lighting and clarity of picture, whether the tape is matched to the learners and setting, and cost. Marketability may be another area to evaluate for future reference (Oermann, 1984).

In summary, the adult learner, learning preferences of allied health students, videotaped versus teacher presented lectures, contructions of videotapes, and evaluation of pretests, posttest, gain scores and videotapes have been discussed in this chapter. Studies have shown that adult allied health students prefer well-organized, teacher controlled lecture-demonstrations as well as some freedom

to control their learning situation. Information has been presented from literature on the contruction and evaluation of videotapes, as well as other evaluation pertinent to this topic.

CHAPTER III

METHODOLOGY

This study used a quasi-experimental pretest-posttest control group design. Investigator designed alternate form pretests and posttests were utilized in the study.

Setting

An experimental and control group of Texas Woman's University senior physical therapy students participated in this study. They were presented a videotape or teacher-presented module in near identical classrooms of the Dallas Presbyterian campus of Texas Woman's University School of Physical Therapy.

Population and Sample

The population included all senior physical therapy students at Texas Woman's University, 60 students. Only 30 students at Texas Woman's University Dallas Presbyterian campus were utlized for the sample of convenience. On the day of presentation, only 26 senior physical therapy students were present. Thus, the actual sample size was 26. The experimental group consisted of 14 students; the control

group consisted of 12 students. The names of the students were selected for the experimental and control groups by the draw and replace method of random assignment. The first name drawn went into the A pile. The second name drawn went into the B pile. This was repeated until all were placed in a group. Group A was randomly labeled the experimental (videotape) group. Group B was randomly labeled the control (teacher-presented) group.

Protection of Human Subjects

The actor in the videotape was a volunteer who signed a consent form. The consent form may be seen in Appendix A. Permission was obtained from the Academic Coordinator of Clinical Education and the Dean ad interim of Texas Woman's University School of Physical Therapy to conduct the study. This letter appears in Appendix B. A coding system was developed and placed on the tests for the purposes of score matching and data analysis. The students were arbitrarily assigned a single or double digit number and asked to add it to the top right corner of the cover page of each test taken. This method insured that no student names would appear, and that test scores could be paired. The master list was kept by the investigator. The tests were also pre-coded by the investigator on the back

with a combination of letters and numbers to indicate which test it was and to which subgroup it belonged. An example of the system was 1a, 2a and 3a equaled the pretest, posttest 1 and posttest 2, respectively, for the videotape (experimental) group; 1b, 2b, and 3b equaled the pretest, posttest 1 and posttest 2, respectively, for the teacher presented (control) group.

Instruments

Teaching Module and Development of the Videotape

The topic of evaluation and treatment and thoracic outlet syndrome was selected for the lecture-demonstration. This topic was arbitrarily selected, but it is one that must be integrated into the physical therapist's knowledge case prior to graduation. A brief literature review was conducted to obtain lecture content. The researcher created learner objectives and a teaching outline prior to developing the presentation. See Appendixes C and D. Clinical expertise of the researcher was utilized to develop the demonstration portions of the module.

Development of the Videotape

A script of the lecture-demonstration was written by the researcher. See Appendix E. Slides of anatomical content were taken by the researcher to be used in the

lecture-demonstration. The script was reviewed by the research committee for length and presentation. A title poster was created.

The script was synchronized with the slides. Cue posters were made for any prompting needed by the instructor during the taping. Copies of the script were distributed to the actor and the volunteer cameraman, and clarifications made. Two rehearsals were conducted in the room to be used for the final taping session. These were researcher directed.

A lecture room and the video camera and monitor of a large metroplex hospital were used for the taping session. The researcher rented a compatible videocassette recorder for the session. The lecture-demonstration was presented by the researcher. Visuals and sound were recorded in one session. Filming was done on a Sunday to limit interference and assure a better production. Equipment used included a Magnavox color video camera (model VJ8230BR01), a Sony recorder (model VO-2610), a Sony color monitor (model PVM-1900), and a 3/4-inch Sony color videocassette tape. Adherance to the script was kept as exact as possible during the taping. Posters with script cues for the instructor were visible at the back of the room.

Evaluation of the Videotape

Four clinical experts viewed the videotape of the teaching module for content and technical qualities. Two of these people also had educational expertise, and one had photographic expertise. One had previous experience developing a teaching videotape. The experts evaluated the tape using a researcher developed instrument. See Appendix F. The experts indicated agreement with the content, and presentation in all categories except those relating to voice, lighting and length of videotape. Responses given by the experts are seen in Appendixes G and H. Overall, three of the four experts agreed the tape was acceptable.

Development and Evaluation of the Pretest and Posttests

A 20 question multiple choice alternate form pretest and posttest were written by the researcher. See Appendices I, J and K. These were not identical. Five clinical and education physical therapy experts were selected by the researcher who lived near and volunteered to compare the pretest and posttest for content inclusion, wording and order. Three of the experts were academic physical therapy educators, two had experience as physical therapy clinical educators. All agreed the tests could be used with minor

wording corrections. Each person made the comparisons individually. The researcher had predetermined that changes would be made if four of the five experts recommended it. Some recommended changes were made. Examples of such changes included using more parallel distractors, using more distractors per question, decreasing the number of treatment application questions, and the inclusion of another set of muscles for one question. No content changes were made.

A cover sheet to the pretest was developed to gather demographic information on each student. Information on ethnic origin, number of years in college, degree held, whether the student works, and, if so, the number of hours per week, and the job classification of the student and the parent was solicited. See Appendix L.

One point per each of the 20 questions was assigned for scoring. Raw scores were computed based on an answer key developed by the researcher. See Appendix M. The researcher hand scored each pretest and posttest for both subgroups. The maximal score achievable was 20 points.

Pilot Study

Permission was obtained to conduct the pilot study at The University of Texas School of Health Science Center at

Dallas. See Appendix N. Fourteen senior physical therapy students volunteers for the pilot study. The draw and replace method was utilized to randomly assign the student to either the experimental or control group. The first name drawn went into the experimental group, the second into the control group, and so on until all names were assigned to a group. Each group had seven students. The researcher conducted the lecture-demonstration for the control group. A preselected physical therapist monitored the experimental group and operated the videocassette. Two near identical classrooms were utilized for the simultaneous sessions. Identical instructions were given to the students by the researcher prior to dividing them into the respective groups. No talking was allowed during the study on that day. The pretest was distributed, completed, and collected. The lecture-demonstration was then immediately given. In the control group the same actor used for the videotape was present for the demonstration. Immediately following the one hour lecture demonstration the posttest was distributed, completed, and collected. Students in each group were arbitrarily assigned numbers to place on the top right corner of the tests in order to pair the test scores. Twenty-four hours later, the Academic Coordinator of Clinical Education distributed a second posttest to the fourteen

subjects. Again, the subjects were asked not to talk or ask questions as they took the test. These were immediately completed and returned. The researcher then received the posttests. An answer key was then posted for the students who participated in the pilot study.

Demographic data were also solicited, and tabulated. The ages ranged from 21 to 34. There were 9 female and 5 male subjects. Ten subjects were White, 3 were Hispanic, and 1 was Oriental. The years in college ranged from 4 to 15, with the average number of years being 5.5. Five out of the 14 subjects held previous degrees. All were seeking a Bachelor's degree. Two subjects worked, and the hours ranged from 2 to 8 per week. Both persons worked in a professional capacity. Eight subjects had parents who worked as professionals, 5 as blue collar workers, and 1 subject did not answer. See Appendix O. No further statistical comparisons were made in the pilot study due to the small number of subjects. The investigator hand scored each test. The mean, range, and standard deviation for both groups was computed. See Appendix P.

No changes between the pilot study and the final study were made. The test completion time for both the pretest and posttest was verified at 15 to 20 minutes per individual in each group. The numbering system by the students to

pair test scores without disclosing identity was accepted for the final study.

Data Collection

The 26 physical therapy students met collectively with the researcher on April 30, 1986, to hear instructions and receive their group assignment and number. Then they were assigned to the respective classrooms. The study was conducted simultaneously in two near-identical classrooms. The actor was again present for the teacher presented lecture-demonstration. The same person monitored the experimental group and operated the videocassette machine as did in the pilot study. The same script was delivered by the instructor in the live situation as was delivered on the videotape.

The pretests were distributed, completed, and collected. Demographic data were again collected on the cover sheet of the pretest. The one hour lecture-demonstration or videotape was presented. Immediately after the presentation, the posttest 1 was distributed, completed and collected. No talking was allowed in either group during this time. The subjects used 15 to 20 minutes per test for completion. After all posttests in each group were completed, the subjects were allowed to leave.

Completion of posttest 2 occured after the students returned to the school following the summer clinical affiliations. The researcher could not be present. The Academic Coordinator of Clinical Education read the instructions to the students, distributed the second posttest. This was done on August 29, 1986, 4 months following the presentation. All 26 students completed posttest 2. The Academic Coordinator of Clinical Education then collected the posttests and mailed them to the researcher.

Treatment of the Data

The researcher hand scored each test. Demographic data were collected from the participants in both the pilot study and the final study. The mean, range, and standard deviation of each group were computed for the pretest, posttest 1 and posttest 2 for the study. The *t* test at the 0.05 level of significance was done to determine significance between the mean scores of the two groups for the pretest and first posttest, for the pretest and second posttest, and for the first and second posttest. The results are discussed in the following chapter.

CHAPTER IV

FINDINGS

The results of the study are described in this chapter. Narrative results as well as tables of data are presented. Demographics, raw test scores and descriptive data results, *t* test results and the disposition of the hypotheses are presented.

Description of Participants

All participants were senior physical therapy students in the last didactic semester prior to going on clinical affiliations. All 26 subjects were from Texas Woman's University at the Dallas Presbyterian campus.

Demographic Data

The experimental (videotape) group had 14 participants. Ages of this group ranged from 22 to 42. Twelve were female, 2 were male. All were white. The number of years spent in college ranged from 4 to 7.5. One member held a master's degree, 2 held bachelor's degrees, 1 held an associate's degree. All were seeking a Bachelor of Science degree in physical therapy. Five subjects were currently

employed. The work hours of those 5 subjects ranged from 8 hours per week to 25 hours per week. Three of the 5 who were employed did so in clerical positions; 2 held blue collar employment. The employment classification of the subjects parents was also sought. Six held professional employment, 5 blue collar employment, 2 were listed as retired, and 1 did not answer. See Table 1.

The teacher presented (control group) had 12 participants. Ages of this group ranged from 22 to 39. Ten were female and 2 were male. Eleven were White, 1 was Black. The number of years spent in college ranged from 3 to 7. Two subjects held bachelor's degrees, 1 held an associate's degree, and 1 did not answer. All were seeking a Bachelor of Science degree in physical therapy. Four of the 12 subjects were employed while in school. Work hours for these 4 subjects ranged from 8 to 20 hours per week. One of the 4 held a professional position, 2 held clerical positions, and 1 held a blue collar position. Seven stated their parents were employed in professional positions, 4 in blue collar positions, and 1 was listed as retired. See Table 2.

Table 1

Demographic Data of Videotape Group (Experimental)

Number of Participants	Age	Sex	Ethnic Origin	Yrs. in College	Degree(s) Held	Degree Seeking
1	22	F	White	4.5	None	B.S.P.T.
2	23	F	White	5.0	None	B.S.P.T.
3	42	M	White	10.0	B.S. M.S.	P.T. Cert.
4	25	F	White	6.0	None	B.S.P.T.
5	31	F	White	6.0	None	B.S.P.T.
6	28	F	White	4.0	none	B.S.P.T.
7	22	F	White	4.0	None	B.S.P.T.
8	30	M	White	7.5	B.S. A.S.	B.S.P.T.
9	23	F	White	5.0	None	B.S.P.T.
10	22	F	White	4.0	None	B.S.P.T.
11	30	F	White	4.0	None	B.S.P.T.
12	26	F	White	6.0	Assoc.	B.S.P.T.
13	23	F	White	5.0	None	B.S.P.T.
14	23	F	White	5.0	None	B.S.P.T.
SUMMARY:	22 to 42	12 F 2 M	All White	4 to 10	1 Assoc. 2 B.S. 1 M.A.	All B.S. P.T.

Note: N = 14

Table 1, Cont'd

Demographic Data of Videotape Group (Experimental)

Current Employment	Work hrs. per week	Work Classification	Work Classification of Parents
Yes	15.0	Clerical	Blue Collar
Yes	10.0	Clerical	Professional
No	-	-	Retired
No	-	-	Blue Collar
No	-	-	Blue Collar
No	-	-	Blue Collar
No	-	-	Professional
Yes	25.0	Blue Collar	Blue Collar
No	-	-	Professional
No	-	-	-
Yes	12.0	Clerical	Retired
No	-	-	Professional
No	-	-	Professional
Yes	8.0	Blue Collar	Professional
5 of 14	8 to 25	2 Blue Collar 3 Clerical	5 Blue Collar 6 Professional 2 Retired 1 Not Answered

Table 2

Demographic Data of Teacher Presented Group (Control)

Number of Participants	Age	Sex	Ethnic Origin	Yrs. in College	Degree(s) Held	Degree Seeking
15	24	F	White	7.0	None	B.S. P.T.
16	24	F	Black	5.0	None	B.S. P.T.
17	25	F	White	6.0	B.S.	B.S. P.T.
18	29	M	White	7.0	None	B.S. P.T.
19	32	F	White	4.0	None	B.S. P.T.
20	27	F	White	7.0	B.S.	B.S. P.T.
21	39	F	White	5.0	Assoc.	B.S. P.T.
22	22	F	White	5.0	None	B.S. P.T.
23	23	F	White	5.0	None	B.S. P.T
24	23	M	White	5.0	None	B.S. P.T.
25	25	F	White	5.0	None	B.S. P.T.
26	36	F	White	3.0	-	B.S. P.T.
SUMMARY	22 to 29	10 F 2 M	1 Black 11 White	3 to 7	1 Assoc. 2 B.S. 1 No Answer	All B.S. P.T.

Note: N = 12

Table 2, Cont'd

Demographic Data of Teacher Presented Group (Control)

Current Employment	Work Hours per Week	Work Classification	Work Classification of Parents
No	-	-	Professional
No	-	-	Professional
Yes	20.0	Professional	Professional
Yes	20.0	Blue Collar	Blue Collar
No	-	-	Professional
No	-	-	Professional
No	-	-	Blue Collar
No	-	-	Blue Collar
No	-	-	Professional
Yes	10.0	Clerical	Professional
Yes	8.0	Clerical	Blue Collar
No	-	-	Retired
4 of 12	8 to 20	1 Blue Collar 2 Clerical 1 Professional	4 Blue Collar 7 Professional 1 Retired

Analysis of the Data

The data were described for the raw test scores, the *t* test results, and the disposition of the hypotheses. Several tables of data are provided.

Raw Test Data Results

The maximal achievable raw score was 20. See Table 3 for raw test scores of the 2 groups.

For the videotape (experimental) group the raw test scores on the pretest ranged from 8 to 15. The raw scores on posttest 1 ranged from 13 to 19, and those on posttest 2 ranged from 9 to 17. See Table 4. For the lecture-demonstration teacher presented (control) group, the raw test scores on the pretest ranged from 9 to 16. The raw scores on posttest 1 ranged from 12 to 20, and those on the posstest 2 ranged from 10 to 16. See Table 4. The raw scores for each group "peaked" for posttest 1.

The mean and standard deviation of the raw score results per test, per group were also computed. For the videotape (experimental) group the pretest scores mean was 10.357, and the standard deviation was 2.373. The mean of posttest 1 scores for the experimental group was 16.285, and the standard deviation was 1.729. The mean of posttest 2 for this group was 11.642, and the standard deviation was

2.373. See Table 4. The experimental group mean increased from pretest to posttest 1 (10.357 to 16.285). However, after time, it decreased from posttest 1 to posttest 2 (16.285 to 11.742).

For the teacher presented (control) group, the pretest mean was 11.750, and the standard deviation was 1.765. On posttest 1, the mean was 14.833, and the standard deviation was 2.290. On posttest 2 the mean was 12.500, and the standard deviation was 1.834. See Table 4. The control group mean increased from pretest to posttest 1 (11.750 to 14.833) but again decreased over time from posttest 1 to posttest 2 (14.833 to 12.500). Both groups showed an increase in mean scores from pretest to posttest 1, and a decrease between posttest 1 and posttest 2. See Figure 1.

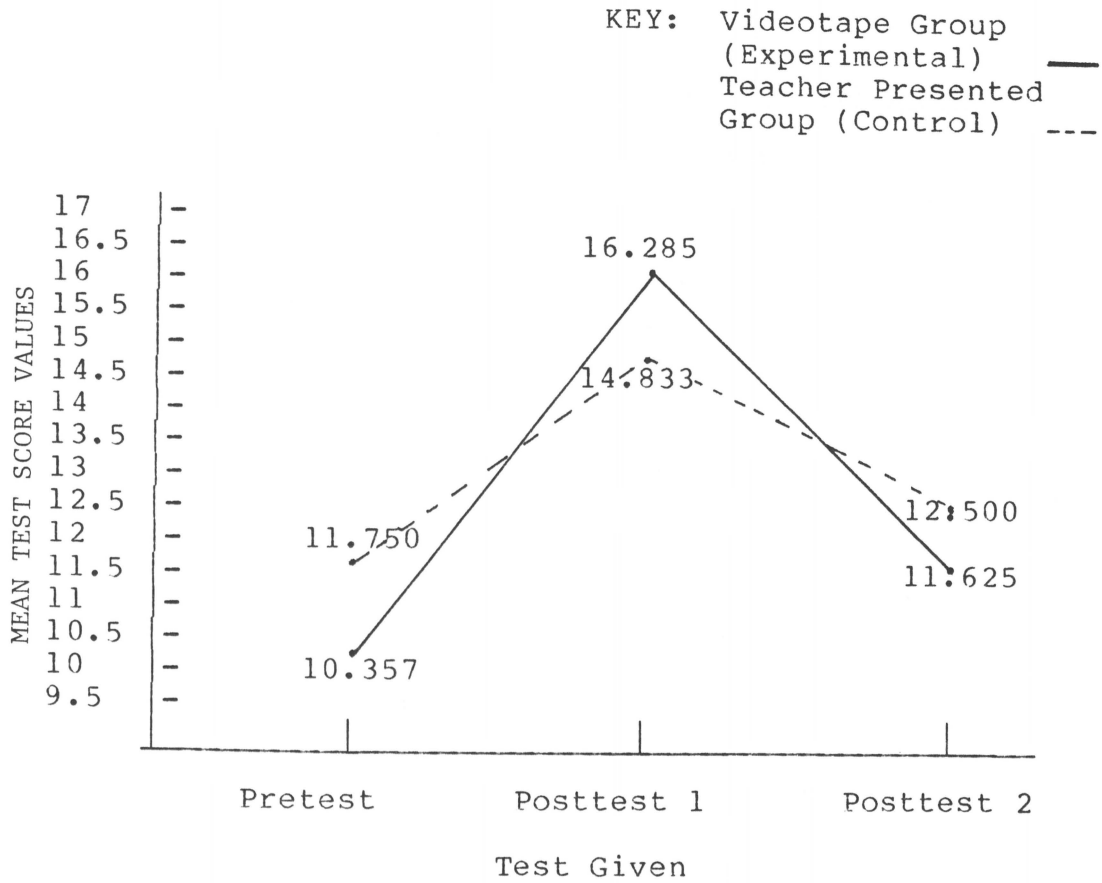

Figure 1

Comparison of the Mean Score Values of the Videotape and Teacher Presented Groups for the Pretest, Posttest 1, and Posttest 2

Table 3

Pretest, Posttest 1, and Posttest 2 Raw Test Scores by Type of Instruction and Participants

Type of Instruction	Number of Participants	Pretest	Posttest 1	Posttest 2
Videotape	1	11.0	15.0	10.0
	2	8.0	19.0	12.0
	3	12.0	16.0	12.0
	4	7.0	13.0	17.0
	5	8.0	17.0	13.0
	6	15.0	17.0	10.0
	7	13.0	19.0	14.0
	8	8.0	14.0	9.0
	9	13.0	18.0	9.0
	10	10.0	17.0	14.0
	11	10.0	16.0	10.0
	12	9.0	16.0	11.0
	13	9.0	15.0	13.0
	14	12.0	16.0	9.0

Note: N = 14 Videotape Group

Maximal Score = 20

Table 3, Cont'd

Pretest, Posttest 1, and Posttest 2 Raw Test Scores by Type of Instruction and Participants

Type of Instruction	Number of Participants	Pretest	Posttest 1	Posttest 2
Teacher Presented	15	16.0	14.0	11.0
	16	11.0	14.0	11.0
	17	11.0	12.0	11.0
	18	12.0	17.0	11.0
	19	10.0	20.0	16.0
	20	12.0	14.0	12.0
	21	9.0	13.0	15.0
	22	12.0	14.0	13.0
	23	13.0	15.0	13.0
	24	11.0	13.0	10.0
	25	11.0	16.0	14.0
	26	13.0	17.0	13.0

Note: N = 12 Teacher Presented Group

Maximal Score = 20

Table 4

Mean, Range and Standard Deviation of Test Scores of the Videotape and Teacher Presented Groups

Group	Test	Mean	Range	Standard Deviation
Videotape (Experimental)	Pretest	10.357	7 to 15	2.373
	Posttest 1	16.285	13 to 19	1.729
	Posttest 2	11.642	9 to 17	2.373
Teacher Presented (Control)	Pretest	11.750	9 to 16	1.765
	Posttest 1	14.833	12 to 20	2.290
	Posttest 2	12.500	10 to 16	1.834

Note: N = 14 in Videotape Group

N = 12 in Teacher Presented Group

The videotape (experimental) group had gain scores of +5.928 from the pretest to posttest 1, +1.285 from the pretest to posttest 2, and -4,643 from posttest 1 to posttest 2. The teacher presented (control) group had gain scores of +3.083 from the pretest to posttest 1, +0.750 from the pretest to posttest 2, and -2.333 from posttest 1 to posttest 2. See Table 5. Both groups illustrated show an increase in mean scores from pretest to posttest 1. The experimental group had higher mean scores than the control group for both the pretest and the posttest.

Hypotheses Results

Hypothesis 1

Hypothesis 1 stated: There is no statistically significant difference between the mean scores of the pretest and posttest 1 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome).

The *t* test was performed on the mean scores of the two groups. The *t* value for the videotaped (experimental) group pretest compared to posttest 1 was -9.93. In order for *t* to be significant at the .05 level for a two tailed test, *t* 13 must be equal to or greater than 2.160 (14 subjects from 1 group with 1 degree of freedom). For the teacher

Table 5

Mean Scores and Gain Scores for the Pretest, Posttest 1, and Posttest 2 for the Videotaped and Teacher Presented Groups

Group	Test	Mean Score	Gain Score
Videotape			
(Experimental)	Pretest	10.357	+5.928
	Posttest 1	16.285	
	Pretest	10.357	+1.285
	Posttest 2	11.642	
	Posttest 1	16.285	-4.643
	Posttest 2	11.642	
Teacher Presented	Pretest	11.750	+3.083
(Control)	Posttest 1	14.833	
	Pretest	11.750	+0.750
	Posttest 2	12.500	
	Posttest 1	14.833	-2.333
	Posttest 2	12.500	

presented (control) group, the t value of the pretest compared to posttest 1 was -3.68. In order for t to be significant at the .05 level for a two tailed test, t 11 must be equal to or greater than 2.201 (12 subjects in one group with 1 degree of freedom). Both groups showed gain from the pretest to posttest 1. See Table 6.

Table 6

Inferential Statistics for Present, Posttest, and Posttest 2 for the Videotape and Teacher Presented Groups

Group	Test	t Value	Critical t Value	p Value
Videotape	Pretest to Posttest 1	-9.93	2.160	0.000*
	Pretest to Posttest 2	-1.21	2.160	0.249
	Posttest to Posttest 2	5.64	2.160	0.000*
Teacher Presented	Pretest to Posttest 1	-3.68	2.201	0.004*
	Pretest to Posttest 2	-0.85	2.201	0.412
	Posttest 1 to Posttest 2	4.10	2.201	0.002*

Note: Videotape Group N = 14, df = 1

Teacher Presented Group N = 12, df = 1

*p equals .05 or less

Comparing pretest scores for the two groups, the t value was -1.67. To be significant at the .05 level, t 24 must be equal to or greater than 2.064 (26 subjects from 2 groups with 2 degrees of freedom). There was no significant difference between the groups on the pretest.

Comparing posttest 1 scores of the two groups, the t value was 1.80. Again, to be significant at the .05 level, t 24 must be equal to or greater than 2.064 (2 degrees of freedom). There was no significant difference between the 2 groups.

Thus, though both the experimental and control groups showed gain between the pretest and posttest 1, there was no significant difference between the two groups. The hypothesis was accepted. See Table 7.

Table 7

t Values and p Values Comparing Videotape and Teacher Presented Groups

Test	*t* Value	Critical *t* Value	*p* Value
Pretest	-1.67	2.064	0.107
Posttest 1	1.84	2.064	0.078
Posttest 2	-1.02	2.064	0.319

Note: N = 26

df = 24

Hypothesis 2

Hypothesis 2 stated: There is no statistically significant difference between the mean scores of the pretest and posttest 2 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome).

For the videotape (experimental) group, the *t* value for the pretest compared to posttest 2 was -1.21. To be significant at the .05 level for a two tailed test, *t* 13 must be equal to or greater than 2.160 (at 1 degree of freedom). The *t* value for the videotape group for the pretest compared to postttest 2 was -0.85. To be significant at the .05 level for a two tailed test *t* 11 must be equal to or greater than 2.201 (1 degree of freedom). Neither was significant, thus no gain occurred for either group. See Table 6.

Comparing pretest scores of the two groups, the *t* value was -1.67. To be significant at the .05 level, *t* 24 must be equal to or greater than 2.064 (2 degrees of freedom). There was no significant difference between the two groups.

Comparing posttest 2 scores of the two groups, the *t* value was -1.04. To be significant, *t* 24 must be equal to

or greater than 2.064 (2 degrees of freedom). There was no significant difference between the two groups.

Though both groups demonstrated mean score gains, there was no significant difference between the experimental and control group. The hypothesis was accepted. See Table 7.

Hypothesis 3

Hypothesis 3 stated: There is no statistically significant difference between the mean scores of posttest 1 and posttest 2 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome).

The t value for the videotape group for posttest 1 compared to posttest 2 was 5.64. To be significant at the .05 level, t 13 must be equal to or greater than 2.160 (1 degree of freedom). The value was significant. For the teacher-presented group, the t value of posttest 1 compared to posttest 2 was 4.10. Again, to be significant at the .05 level t 11 must be equal to or greater than 2.201 (1 degree of freedom). In both groups, a decrease in gain occured; there was a significant difference. See Table 6.

Comparing the pretests of the two groups, the t value was -1.67. To be significant, t 24 must be equal to or

greater than 2.064 (2 degrees of freedom). There was no significant difference between the two groups.

Comparing the posttest 2 scores of the two groups, the *t* value was -1.02. To be significant, *t* 24 must be equal to or greater than 2.064 (2 degrees of freedom). There was no significant difference between the two groups.

A reversal of gain occured in both groups between posttest 1 and posttest 2 over 4 months time. However, there was no significant difference between the experimental and control group. The hypothesis was accepted. See Table 7.

Summary

Both the experimental and control groups demonstrated cognitive gain from the pretest to posttest 1. Both groups demonstrated a reversal of gain over 4 months time between posttest 1 and posttest 2. The videotape group mean scores were lower than those of the teacher presented group on the pretest and posttest 2, but higher on posttest 1. There was no significant difference between the two groups for the *t* test results on the pretest, posttest 1 or posttest 2. Thus, all 3 hypotheses were accepted.

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

Summary

This study was done to compare the learning acquisition of a videotaped versus teacher presented lecture-demonstration teaching module of a preselected topic. Twenty-six senior physical therapy students at Texas Woman's University School of Physical Therapy at the Dallas Presbyterian Campus participated in the study. The participants took a pretest, viewed an investigator-made videotape of a teaching module (Evaluation and Treatment of Thoracic Outlet Syndrome) or heard the same lecture-demonstration presented by the investigator, and then took a posttest. A second posttest was taken by the participants 4 months later, after clinical affiliations. The study looked at whether gain occured after the lecture-demonstration, and whether this was retained over 4 months duration. It also looked at whether there was a significant difference in gain from a videotape versus teacher presented delivery. Three divisions of the null hypothesis were accepted.

Hypothesis 1. There is no statistically significant difference between the mean scores of the pretest and

Hypothesis 1. There is no statistically significant difference between the mean scores of the pretest and posttest 1 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome). Gain occured in each group, but there was not a significant difference in gain between the experimental and control groups.

Hypothesis 2. There is no statistically significant difference between the mean scores of the pretest and posttest 2 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome). Posttest 2 scores were close to those of the pretest, and there was not a significant difference between the experimental and control groups.

Hypothesis 3. There is no statistically significant difference between the mean scores of posttest 1 and posttest 2 following videotaped instruction and teacher presented classroom instruction of a preselected physical therapy topic (The Evaluation and Treatment of Thoracic Outlet Syndrome). Gain decreased over 4 months time, but there was not a significant difference between the experimental and control groups.

Conclusions

For this study comparing the learning acquisition of two teaching methods using the topic of Evaluation and Treatment of Thoracic Outlet Syndrome, several conclusions can be made.

1. By definition for this study, learning acquisition occured with both teaching methods. Both the videotaped and teacher presented strategies resulted in mean score gain from the pretest to posttest 1.

2. There was an increase in learning acquisition for both the videotape and teacher presented teaching strategies over time. The mean gain scores from pretest to posttest 2 were nearly identical for the videotape and teacher presented groups.

3. There was a loss of learning over a 4 month period for both the videotape and teacher presented teaching strategies over time. There was a decrease in mean gain scores between posttest 1 and posttest 2 for both the videotape and teacher presented groups.

Discussion

There are several possible reasons for the outcome of this investigation. These include statistical limitations, the videotape, investigator-made tests, clinical affiliations

and review of material. These are discussed in the next few paragraphs.

Statistical Limitations

There were 14 participants in the experimental group, and 12 in the control group. These are a minimal number on which to run the statistical tests; ideally the experimental and control group should have been larger.

Reliability of the teacher-made tests was not determined. Thus, the consistency of test scores over both a time interval and alternate forms of the test is unknown. This may have been a factor in the outcome of the pretest to postttest 2 and posttest 1 to posttest 2 scores.

Videotape

The videotaped module was done under a limited budget for this study. The investigator acted as a presentor and director, and a volunteer served as cameraperson. There were a few instances where the camera did not focus on the speaker as effectively as it could have. This along with the 1 hour length of the tape may have affected the viewers retention of the material presented during this study.

This study showed that low budget videotape, if well planned and executed, can impart information to student physical therapists as effectively as teacher presented

lecture-demonstration information. This might be a good tool to use in the university setting where established studios and personnel already exist, and often at discounted rates. The cost of teacher presentation and delivery time after time can be compared to the writing of a script and one-time taping session after which the videotape can be replayed many times for individual or group viewings. This may be an important factor since students tend to forget information over time, as was seen with this study. This can be a critical issue in the clinic where direct patient contact is involved. In an era where education is stressing independence by the learner, videotapes might promote this idea when used in conjunction with routine lectures. This would also free the instructor to allow more time to compare more new material or offer one-on-one tutoring or consultation with students. It is certainly a consideration in an era where most students grew up in front of the television set.

Investigator-Made Tests

The pretest, posttest 1 and posttest 2 were made by the investigator. These were critiqued by experts in the field of physical therapy education for content validity. However, the reliability of the tests was not determined

before or after the study was done. This is certainly a limitation to any generalization beyond this study.

Clinical Affiliations

Previous research by others has demonstrated that a decrease in learning occurs over time. For this study, it is known that not all of the 26 participants had identical clinical affiliations. Some of them may have had more opportunity to utilize the information presented in the study than others during the 4 month time difference between posttest 1 and posttest 2. This would contribute to a change in the range of scores.

Review of Material

If the students forget most information within 4 months, it would seem likely that they would utilize refresher videotapes on some of the more detailed clinical or didactic information during the 2 years of study. This could be quite helpful in light of the comprehensive examinations most physical therapy students must take prior to graduation, and as a refresher prior to taking the licensure examination. This idea might also be expanded to clinicians who may not have utilized a particular evaluation or treatment technique in several months or years. It would certainly be safer for the patient involved if the

therapist could review the procedure before delivery of the service. Since the material had already been learned previously, a quick review might be all that is needed.

Recommendations

Several further studies might be done to determine teaching acquisition of videotape teaching modules to physical therapy students. These including the following:

1. The study could be replicated using a larger sample.
2. The study could be replicated using a professionally produced videotape.
3. The study could be replicated using a different length of videotape.
4. The study could be replicated using a different lapse time between tests.
5. The study could be replicated with modification of the testing instruments.
6. The study could be replicated in the clinical setting.
7. Study any change in learning if the videotape from this study was placed in the school library or an affiliated clinic for students to review independently.

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APPENDIXES

APPENDIX A

ACTOR CONSENT FORM

TEXAS WOMAN'S UNIVERSITY

CONSENT FORM

I, the undersigned, do hereby consent to the recording of my image by Barbara L. Woodall, acting on this date under the authority of the Texas Woman's University. I understand that the material recorded today may be made available for educational, informational, and/or research purposes; and I do hereby consent to such use.

I hereby release the Texas Woman's University from any and all claims arising out of such taping, recording, reproducing, publishing, transmitting, or exhibiting as is authorized by the Texas Woman's University.

SIGNATURE OF PARTICIPANTS

Jill Wagner 3/5/86 Date

The above consent form was read, discussed, and signed in my presence. In my opinion, the person signing said consent form did so freely and with full knowledge and understanding of its contents.

Barbara Woodall 3/5/86 Date

Witness

APPENDIX B

LETTER OF PERMISSION TO CONDUCT THE STUDY AT THE TEXAS WOMAN'S UNIVERSITY

TEXAS WOMAN'S UNIVERSITY

CONSENT FORM

We, the undersigned, do hereby grant permission to Barbara L. Woodall to conduct an educational experiment on the Presbyterian campus of The Texas Woman's University. We understand that the senior physical therapy class will be subjects, and that classroom space and a videotape cassette and moniter belonging to the campus will be utilized for the study. We understand that the data gathered from this experiment may be made available for educational, informational,and/or research purposes; and we do hereby consent to such use. We hereby also consent to the use of the name of this program and school in the written and oral presentation of this material.

Dorn W. Long

Dorn Long
Academic Coordinator of
Clinical Education
Department of Physical Therapy
Texas Woman's University
Presbyterian Campus

10-24-85
Date

Ann L. Walker

Ann Walker, Dean ad interim
Department of Physical Therapy
Texas Woman's University
Denton/Dallas

10-22-85
Date

APPENDIX C

LECTURE-DEMONSTRATION OBJECTIVES

LECTURE OBJECTIVES

Following the lecture-demonstration, the learner will:

1. Define thoracic outlet syndrome.
2. Identify electromyographic nerve conduction velocities that indicate possible thoracic outlet involvement.
3. Identify terms synonymous to that of thoracic outlet syndrome.
4. Recognize possible anatomical reasons for thoracic outlet syndrome to occur.
5. Identify primary muscles involved in thoracic outlet syndrome.
6. Recognize which vascular and nervous structures are involved with thoracic outlet syndrome.
7. Select appropriate evalution procedures for patients suspected of having thoracic outlet syndrome.
8. Recognize subjective patient complaints that occur with thoracic outlet syndrome.
9. Recognize positional tests that replicate thoracic outlet syndrome symptoms.
10. Select muscle length and strength tests for the thoracic outlet syndrome patient.
11. Choose priority muscle length and strength tests for the thoracic outlet syndrome patient.
12. Correlate muscle length and strength tests to anatomical problems and complaints of the thoracic outlet syndrome patient.
13. Interpret evaluation results to select effective patient treatments.
14. Combine treatment techniques appropriately and efficiently for the patient with acute thoracic outlet syndrome symptoms.

15. Combine treatment techniques appropriately and efficiently for the patient with chronic thoracic outlet syndrome symptoms.

16. Choose an appropriate exercise progression for the thoracic outlet syndrome patient.

APPENDIX D

LECTURE-DEMONSTRATION MODULE OUTLINE

LECTURE MODULE OUTLINE

Thoracic Outlet Syndrome

I. Definitions
   - A. Electromyographic
   - B. Compression explanations
   - C. Synonymous terms
     1. Costoclavicular syndrome
     2. Scalene anticus syndrome

II. Brief Review of Anatomical Structures
   - A. Bony
     1. Clavicle
     2. First rib
     3. Acromion
   - B. Muscular
     1. Scalenes
     2. Pectoralis minor and major
     3. Latissimus dorsi
     4. Trapezii
     5. Rhomboids and levator scapulae
   - C. Vascular
     1. Subclavian artery
     2. Brachial artery and vein
     3. Axillary artery and vein
   - D. Nervous
     1. Brachial plexus trunk
     2. Median and ulnar nerve to hand

III. Physical Therapy Evaluations
   - A. Subjective
     1. Sensory changes of numbness or tingling
     2. Chest pain
     3. Pain in arm with it raised overhead
     4. Decreased control of finger dexterity
     5. Cold feeling in hand
     6. Neck pain
     7. Headaches
     8. Positions that increase or decrease pain
     9. Descriptions of job or school activities
     10. Hobbies, sports, weight training
     11. Previous problems or treatments
   - B. Positional Tests of the Upper Extremity and Head
     1. Adson's maneuver
     2. Hyperextension and external rotation of arm
     3. Arm raised and abducted overhead

C. Muscle Length
    1. List of muscles to check
    2. Relationship to neuro-vascular bundle
    3. Relationship to posturing
    4. Relationship to muscle strength
    5. Demonstrate test positions
    1. List of muscles to test
    2. Relationship to compression of neuro-vascular bundle
    3. Demonstration of test positions
D. Muscle Strength
    1. List of muscles to test
    2. Relationship to compression of neuro-vascular bundle
    3. Demonstration of test positions
E. Sensation
    1. Pain
    2. Temperature
    3. Dermatome level

IV. Interpretation of Evaluation Results
A. Summarizing the results
B. Placing problems in priority

V. Treatment
A. Tailoring the treatment to patient needs
B. Pain Relief
    1. Modalities available
    2. Combinations of modalities
    3. Acute versus chronic pain
C. Exercises
    1. Rationale as related to posture and compression
    2. Stretching the anterior muscles
    3. Strengthening the posterior muscles
    4. Progression of strengthening exercises
D. Mobilization
    1. Sternoclavicular joint
    2. Acromioclavicular joint
    3. Demonstration of techniques
E. Postural Instruction
    1. Review correct alignment
    2. Related to job and home activities

VI. Case Presentation
- A. Patient demographic information
  1. Age
  2. Sex
  3. Job
  4. Hobbies
  5. Chief complaint
- B. Evaluation results
- C. Treatment choice
- D. Progression of patient
  1. Results of treatment
  2. Progression of treatment choices

APPENDIX E

SCRIPT OF THE LECTURE-DEMONSTRATION

EVALUATION AND TREATMENT OF THORACIC OUTLET SYNDROME

The topic of this lecture is thoracic outlet syndrome. This term was coined in the late 1950s by a group of physicians who first noted arterial occlusion problems related to certain patient complaints. Throughout the years, several other terms have been used synonymously. Generally, the definition of thoracic outlet syndrome is a change in the neuro-vascular mechanism as a result of compression between a cervical rib and the anterior scalene muscle, or between the anterior and middle scalene muscles. This is also referred to in the literature as the scalene-anticus syndrome or the first rib syndrome.

The costoclavicular syndrome is another syndrome which may be included in discussion of thoracic outlet problems. In the costoclavicular syndrome, pressure is placed on the subclavian artery and vein by a narrowing of the space between the clavicle and the first rib.

Again, in the 1950s, electromyographic (EMG) examinations and nerve conduction velocity tests of the ulnar nerve at the truck led to another definition of thoracic outlet syndrome. Normal ulnar nerve conduction velocities through the outlet range from 60 meters per second to 72.2 meters per second. Outlet conduction velocities for patients with thoracic outlet syndrome average around 57.8 meters per second or below.

To further understand what these definitions mean to the patient and therapist, we need to review some of the anatomy of this area. Bony structures involved are the clavicle and the first rib. The clavicle attaches to the sternum medially at the manubrium by the sternoclavicular ligament and laterally to the scapula at the acromion by the acromioclavicular ligament. The first rib attaches to the vertebra at the body, and anteriorly at the manubrium of the sternum by costocartilage. The first rib also has a groove cranially for the attachment of the anterior scalene muscle, and has a groove on the top surface for the subclavian artery and vein to come over the top of it.

There are also several muscles we should review. The most important are the scalenes, pectoralis major and minor, the latissimus dorsi, the trapezii, and the levator scapulae and rhomboids.

The anterior scalene originates on the transverse processes of the third, fourth, fifth, and sixth cervical vertebrae and attaches on the cranial surface of the first rib. The middle scalene originates from the transverse processes of the second through the seventh cervical

vertebrae and inserts on the cranial surface of the first rib. The posterior scalene originates from the transverse processes of the last three or four cervical vertebrae and inserts on the anterior-lateral surface of the second rib. When the insertion remains stable, these muscles act together to laterally flex the head to the same side and rotate to the opposite side.

The pectoralis minor originates on the superior margins and outer surfaces of the third, fourth and fifth ribs and from fascia over the intercostal muscles and attaches on the coracoid process of the scapula. The pectoralis minor acts to tilt the scapula forward when the origin is fixed. The pectoralis major originates from one half of the anterior-medial surface of the clavicle, the anterior sternum and from cartilages of the first six or seven ribs. It inserts on the greater tubercle of the humerus. Its action, when its origin is fixed, is to adduct and internally rotate the humerus.

The latissimus dorsi orginates on the spinous processes of T1 thorough T12 vertebrae, through the thoraco-lumbar fascia all the way down, from one third of the iliac crest, and the last three or four ribs. It inserts on the inter-tubercular groove of the humerus and acts to adduct and internally rotate the humerus, and depress the shoulder joint.

The upper trapezius originates from the occipital protuberance, the ligamentum nuchae and the spinous process of C7. It inserts on the lateral half of the clavicle and the acromion process which you cannot see here. It acts to elevate the scapula when acting alone; otherwise it helps stabilize when the middle trapezius works. The middle trapezius arises from the spinous processes of the first through the fifth thoracic vertebrae and inserts on the spine of the scapula. Its action is to adduct the scapula medially. The lower trapezius originates from the spinous processes of the sixth through the twelfth thoracic vertebrae and inserts on the apex of the spine of the scapula. It acts primarily as a stabilizer for the middle trapezius, but when acting alone it will upwardly rotate the glenoid fossa.

The levator scapulae muscle originates from the transverse processes of the first four cervical vertebrae and inserts on the medial border of the scapula near the superior angle. With the origin fixed it elevates the scapula. The rhomboid originates from the spinous processes of the second through the fifth thoracic vertebra inserts along the vertebral border of the scapula. Its

action is to adduct the scapula. This concludes the review of muscle attachments and actions involved in the evaluation and treatment of thoracic outlet patients.

Let us now move on to the vascular structures. The first structure we will review is the subclavian artery. On the left, which isn't pictured here, it arises from the arch of the aorta, and on the right from the brachiocephalic artery. It is usually divided into three parts in the literature; (1) from the origin to the medial border of the anterior scalene muscle, (2) underneath the anterior scalene muscle, and (3) from the lateral border of the anterior scalene muscle to the lateral border of the first rib. Note that the middle portion runs over the rib and is underneath the anterior scalene muscle and forms the highest arch of the vessel. The subclavian vein lies anterior to the artery and the muscle which is not pictured here. The axillary artery begins at the outer border of the first rib and ends at the distal border of the teres major muscle. Beyond this point it is called the brachial artery. The middle portion of the axillary artery lies underneath the pectoralis minor muscle. When the arm is down by the side, the artery is convex. When the arm is elevated overhead, the artery becomes concave and is further compressed under the pectoralis minor if it is tight.

The subclavian vein extends from the lateral border of the first rib to the medial portion at the sternum. It runs in a depression on the first rib. The axillary vein begins near the lower border of the teres major muscle up to the lateral border of the first rib. Remember, the vessels are described by the direction of the blood flow.

Now let's move on to briefly review the brachial plexus and its location in relation to the other structures mentioned so far. The brachial plexus is a combination of nerve roots, trunks, divisions, cords and finally the nerves themselves. The brachial plexus nerve roots arise from C4 through T1 vertebral levels. These nerve roots coalesce to become the trunks. The fifth and sixth cervical nerve roots join to form the superior trunk. It emerges between the anterior and middle scalene muscles. C7 nerve root becomes the middle trunk, and the inferior trunk is a combination of the C8 and T1 nerve roots. These further subdivide into the anterior and posterior divisions. The cords are further subdivisions and are named by their relation to the axillary artery. The lateral cord is the anterior division of the superior and middle trunks. The medial cord is the anterior division of the inferior trunk. The posterior cord is a combination of the posterior

divisions of all three trunks. The lateral cord becomes the median nerve. The ulnar nerve comes off the medial cord. The radial and axillary nerves come off the posterior cord.

There are a lot of other nerves, but we have concentrated most on those most involved with thoracic outlet problems. This concludes the review of anatomical structures. It should provide a baseline to help correlate patient complaints with objective results of your physical therapy evaluation of a patient having thoracic outlet syndrome.

Now let us move on to the evaluation of the patient. It is very important to talk to the patient and learn about his or her subjective complaints. Where does the patient hurt? Is the chest wall, shoulder, scapular area, or arm uncomfortable? Is the patient having sharp pain or is it a dull ache? Is there a subjective complaint of numbness or tingling in the arm and hand, especially in the median or ulnar nerve distribution? Does the patient state that the hand hurts or tingles more when its overhead, or after doing work requiring use of both arms and a flexed head postion? (Such as typing or plumbing work). Does the patient tell you he or she feels there is decreased control of hand dexterity or that it feels more cold lately? Is the patient having increased incidence of headaches? Are these related to periods of static position and what are these positions? What positions seem to aggravate the patient's discomfort; be specific as to trunk, upper extremities and head and neck positions. What positions seem to make the patient feel better and which ones make him or her feel worse? What position does the patient usually sleep in? Does he or she sleep prone with the head rotated and the arm elevated?

Find out exactly what is involved in the patient's job. Have the patient describe it to you in detail. What positions does the patient assume on the job? Does the patient use the arms a lot? What position are the head and neck in?

Find out if the patient has recently gained a significant amount of weight. What are his hobbies? Does the patient ride a 10-speed bicycle in a bent forward position for numerous miles? Does the patient swim? If so, does he or she only do the forward crawl stroke? Does the patient lift weights? If so, get the patient to describe the amount of weight, the number of repetitions, and the direction of push or pull. Is the patient a student who sits at a typewriter, desk or a computer? If so, what is the height of the work surface and how long does he or she

stay there? Lastly, you should ask the patient if there have been previous episodes of this problem, if any therapy was given, and if it was successful in eliminating the discomfort.

All these questions are not a waste of time and merely probing into the personal affairs of the patient. This type of information can prove invaluable if the therapist is trying to tailor a treatment program.

Let us now look into the physical tests of the patient. These activities include positional tests of the upper extremities in relation to the neck and head to replicate symptoms, checking muscle length and strength, and testing sensation.

The Adson maneuver involves tensing the anterior and middle scalene muscles. Instruct the patient to extend the head and neck, turn his head toward the side of complaint, and take a very deep breath. This position decreases the space between the scalenes and compresses the subclavian artery and the C8 and T1 portions of the brachial plexus against the first rib. Palpate for a decrease in the radial pulse. Any kind of pulse decrease suggests compression in the outlet area.

Another technique is to ask the patient to rotate the head fully to the side of pain and actively pull the chin down into the hollow at the clavicle by flexing the head. Ask the patient about subjective complaints.

Often, hyperextension and external rotation or hyperabduction of the arm creates pain, numbness or complaints of cold in the arm or hand. Check to see if there is a pulse dropout and ask if there are any subjective complaints. Another test is to elevate the patient's arms overhead and ask them to hold them there for a minute or two. This position often reproduces chest, neck and arm symptoms due to the compression at the interscalene triangle formed by the scalenes, the clavicle and the first rib. Lastly, the military position is another one to check. The arms are drawn downward and backward and this narrows the space between the clavicle and the first rib. Often this decreases the radial pulse and reproduces patient symptoms of chest and arm complaints. This test is often referred to as the costoclavicular maneuver in literature. These tests simply tell the therapist whether symptoms can be replicated, and must be considered in conjunction with radiological reports, electromyographic results, and other physical therapy evaluations.

So far, we have reviewed the muscles that are involved in patients suspected of having thoracic outlet syndrome.

Now we shall review some of the tests for muscle length. To be thorough, it is best to evaluate all the cervical and shoulder muscles, however, for this lecture, we will limit these today.

To begin we are going to check the posterior cervical extensors. Ask the patient to sit in a straight back chair and flex the head forward. Normal length allows the chin to touch the chest. Note: tell the patient to keep the mouth closed and the teeth resting together. Next, check the cervical flexors. Ask the patient to look up at the ceiling. Normal length allows the patient to look directly overhead. To check the rotators, ask the patient to look slowly from side to side while keeping the chin level as if resting on a board. Normal length of the rotators allows the chin to line up just in front of or over the shoulder.

To check upper trapezius length, ask the patient to keep the face forward and the shoulders down, and move the ear toward the shoulder. Normal length allows forty-five degrees of this lateral motion without rotation of the neck or elevation of the shoulders. To help maintain the shoulder position, ask the patient to hold the chair with both hands to stabilize the shoulders down. The therapist must observe closely for substitions.

To look for rhomboid and levator scapulae length look at the position of the scapula in reference to the spine and compare to one another. Normal length allows the scapulae to be equal distance from the spine and in good positions vertically.

To test for the length of the scalene muscles, ask the patient to extend the neck and rotate his head toward the side being tested. There is not a very objective test for this. If the scalenes are very tight, the patient will be unable to combine the extension with the rotation motion, and will complain of a deep pulling or tight sensation near the insertions.

It is important to check the length of the pectoralis major and minor muscles which is done with the patient supine. As you recall, the pectoralis major consists of a sternal and clavicular portion. To test the sternal position, start with the arms down by the patient's side, and ask the patient to slide the arms out and up into 135 to 140 degrees of abduction. The end result should be a "V" position. Normal length allows the patient to assume this position with the arms straight and the upper arm in contact with the mat. If that does not occur you should note the degree of angle formed.

The clavicular portion of the pectoralis major is also tested with the patient supine. The patient begins in the same position as the sternal test; he is asked to slide the arms out and up until level with the shoulders.

Again, normal length allows this position while maintaining arm contact with the supporting surface. Note the distance between the upper arm and the support surface if the arm is elevated.

The pectoralis minor is also tested while the patient is supine. The patient's arms are positioned at rest by the sides. Check the angle between the upper border of the shoulder and the supporting surface. Ask the patient to draw the shoulders back and place them against the surface. Normal length allows the shoulder to go flat against the supporting surface. Note any visible space if some remains.

Finally, it is wise to test the latissimus dorsi length. Due to it's insertion, if this muscle becomes tight it contributes to the adduction and internal rotation of the humerus and thus accentuates the rounded shoulder posture. So, to put the lower portion on a stretch, we are going to place the patient supine and flex the knees to place the low back flat. Then ask the patient to raise the arms straight overhead and place them on the mat. Normal length allows this without an anterior tilt. If the pelvic tilt does occur, instruct the patient to hold a posterior tilt and repeat the arm movement. Check the distance between the upper arm and the supporting surface. Normal length allows the arms to touch while keeping the low back flat.

Why is it important to test the length of all these muscles? If an imbalance of muscle length on the anterior surface compared to the posterior shoulder girdle surface occurs, a change in posturing will occur, and this will affect strength of the musculature. Recall from other courses you have had that when a muscle remains in a shortened position for a significant length of time the fibers become shortened. Shortened muscles are generally stronger than overly lengthened ones. If the pectoralis and scalene muscles are shortened or become hypertrophied, and the middle and lower trapezius muscles, or the rhomboids and levator scapulae muscles are allowed to become overly lengthened and weaker an imbalance occurs. This may contribute to a compression at the outlet and a continued posture of rounded shoulders. Tight scalene muscles compress the subclavian artery, the vein and the brachial plexus. A tight pectoralis minor muscle can compress the axillary artery and the vein as well as the cords of the

brachial plexus. A hypertrophied or a tight pectoralis major muscle from continual poor posture will contibute to the compression. You should check the length of the anterior shoulder and neck muscles prior to progressing through a manual muscle test.

So now we will move on to manual muscle testing of the involved muscles. The therapist should evaluate strength of the upper trapezius, the middle and lower trapezius, the rhomboids, the levator scapulae, the pectoralis major and minor, the serratus anterior, and the upper extremity and hand muscles. We will limit our discussion down to the serratus muscles. Muscle test positions referred to in this lecture are those proposed in the book Muscles, Testing and Function by Kendall and Kendall, 1971. Several of the test positions may be a little different than conventional test positions often learned.

The upper trapezius is tested with the patient in the sitting position. Place the patient's head in extension, rotation to the opposite side, and elevate the same shoulder. Thus, the upper trapezius is in its most shortened position. To test, attempt to flex and de-rotate the patient's head while depressing the shoulder. Remember to test three times, and to test both sides.

The patient is positioned prone to test the middle and lower trapezii. For the middle trapezius, place the patient's arm in 90 degrees of abduction and full external rotation with the thumb toward the ceiling. Note: It is important to have tested the pectoralis length in order to assume this position. Stabilize the opposite shoulder. Passively lift the arm up. Ask the patient to hold the arm in this position. If it does not lower, apply resistance distally. To test to lower trapezius, place the arm in a "V" position, abducted about 135 to 140 degrees in full external rotation with the thumb pointed to the ceiling. Repeat the same procedure as described for testing the middle trapezius. The patient receives a grade of fair (F) if he lifts the arm into full range against gravity. If the extremity lowers when passively placed in full position, the grade is poor (P) or below.

The rhomboids and levator scapulae are also tested unilaterally, and with the patient in prone position. The arm is placed in a position often described as a "chicken wing" position. The elbow is flexed, and the humerus is adducted toward the body and extended and externally rotated. This adducts and elevates the scapula, and medially rotates the inferior angle. Resist abduction and depress the shoulder.

The pectoral muscles are tested with the patient supine. The starting position for testing the sternal portion of the pectoralis major is the same as the length test position described earlier. The patient starts with the elbow extended, the shoulder in flexion to mimic the direction of the fingers, and slight elbow flexion. The patient pulls the arm toward the opposite hip. The pelvis is stabilized, and resistance is applied at the forearm, in an upward and diagonal direction. The starting position for testing the clavicular position of the pectoralis major is with the patient supine and the elbow extended, the shoulder in 90 degrees flexion, slight internal rotation and adduction. The opposite shoulder is stabilized, and resistance is applied at the forearm into horizontal abduction. The pectoralis minor tilts the scapula forward. In order to test, we will ask the patient to thrust the shoulder forward with the arm by the side. Resistance is applied downward against the shoulder.

The serratus anterior originates on the outer surfaces and upper borders of the first 8 or 9 ribs and inserts on the rib surface of the scapula. It acts to abduct the scapula and upwardly rotate the glenoid fossa. The serratus is best tested with the patient sitting so the test is not affected by external support on the scapula. The patient's arm is placed in a position of 120 to 130 degrees flexion and slight internal rotation. Resistance is applied against the lateral border of the scapula to rotate the inferior border medially, and on the upper arm above the elbow in the direction of extension. If this muscle is weak, a winging of the scapula will occur.

This concludes the muscle testing portions we need to be concerned with. If the evaluator is mindful of the origins, insertions, and the actions of the muscles, he or she can correlate the test grades to the patient complaints and symptoms. Remember that overly strong pectorals and weak trapezii, serratus, rhomboids or levator scapulae contribute to postural compression at the outlet.

It is also important to evaluate the sensation of the patient. In particular, pain and temperature should be evaluated. You need to compare objective results of the tests with the subjective complaints the patient has. After the procedures are explained, get the patient when blindfolded to state both awareness of an localization of the stimulus. Compare the results to the dermatomes to see if there is a real decrease in sensation. Does the decrease correspond to any muscle weaknesses? Are nerves being compressed at the root level or more distally? Refer to

materials and references you have been given previously for specifics of sensory testing techniques.

Up to now we have completed a review of evaluations the therapist should do on the patient suspected of having thoracic outlet syndrome.

We must now summarize our evaluation results so we can place the problems in priority and decide which to address first and what kind of treatment to create. For example, suppose the patient had subjective complaints of chest pain and numbness and tingling down the right arm in the ulnar distribution. Suppose we found the ulnar dermatome was decreased but not absent for pain and temperature. Suppose we also found the middle and lower trapezii to have poor (P) strength, and the right wrist ulnar flexor has good minus (G-) strength. The pectoralis major and minor were tight (postural) and the patient's overall posture was one of rounded, slumped shoulders. The patient told us the symptoms increase when he raises the arm overhead, or after sleeping on the stomach. From these findings we can summarize that there is an imbalance of pectoral to trapezius muscle length and strength which may contribute to the already poor posture. The flexor carpi ulnaris is supplied by the ulnar nerve, from the roots of C7, C8, and T1. This tells us he has weakness and sensory loss in this distribution. When the patient raises his arm or sleeps prone with the arm in the same position the scalenes are shortened, the clavicle is elevated and compression occurs. Without radiological reports and electromyographic (EMG) results we cannot rule out cervical vertebra compression of the nerve roots, but if we design a treatment of pain control, relaxation, balancing muscle length and strength and patient education, the patient may have decreased symptoms and thus decreased discomfort.

So, with this patient example, our priority problems are: Patient discomfort, muscle length and strength imbalance, poor posture, compression at the outlet from postural and sleep patterns. If these are corrected, the sensory changes may disappear, and the patient may be free of discomfort and thus more functional.

Now we need move on to the physical therapy treatment of thoracic outlet syndrome. It is very important to tailor the treatment to the specific need of each patient. Strengthening or stretching exercises and modalities appropriate for one patient may not be appropriate for another.

If the patient is in discomfort it is best to begin with some modality or combinations of them to relieve the

discomfort. For the acute patient, ice packs to the cervical and outlet areas might be more appropriate than heat to these areas. Remember that ice has almost the same physiological effects as heat but it also has a numbing effect that may be helpful to both the therapist and the patient for later in the treatment. If the patient does not tolerate ice, hot packs work well. Beware they are not too heavy and thus increase compression. It is usually best to have the patient supine or semi-supine and thus totally supported in a position for maximal relaxation. After heat or ice is applied, a gentle to deep massage may be given to further relax the patient and palpate for spasms. Five minutes or less of massage is sufficient. Other modalities that are useful include ultrasound, LASER (light amplification by stimulated emission of radiation) with or without the neuroprobe (electrical stimulation), high voltage electrical stimulation near tetany or at a fast rate to promote muscle relaxation, transcutaneous electrical stimulation (TENS), and flouromethane spray and stretch. Any combination of these modalities might be used. Sometimes you might need to play with them and try different ones to find the best combination. For example, if the patient complains of neck and chest pain we might use ice packs, ultrasound to trigger points and LASER with neuroprobe to oulet spots in the neck and arm. The use of heat or ice again depends on whether the patient is considered acute or chronic. Ice works well in the acute stage. Heat relaxes the chronic patient. However, there is not a hard and fast rule about this and it is up to you to decide what gives you the best results.

After relaxation is achieved, you need to gently stretch the tight muscles. For our patient with tight pectorals we might begin with supine isometric stretching of the sternal and clavicular pectoralis major and pectoralis minor. These are the same position as the length test position for the pectorals. This technique works well with acute patients who do not tolerate active prone stretching. In addition, this is also isometric contraction of the middle and lower trapezius muscles which we said were weak. The patient should be able to tolerate at least five repetitions initially without discomfort. If the patient is an in-patient, and is seen twice a day, after a few days he may tolerate prone active strengthening of the middle and lower trapezii. This would increase the stretch on the anterior pectoral muscles also. The prone position is even better than the sitting position to isolate out substitutions, but sitting is a nice interim position. The

patient may also be doing strengthening exercises for the flexor carpi ulnaris.

If our patient continues to improve, by the end of a week we should find a one half to one grade increase in muscle strength, decreased patient complaints of discomfort, and near normal length of pectoral muscles. Of course, all of this might be achieved earlier, but it is dependent on patient potential, compliance, and the program you design. So let's say the patient did progress. We can now add more advanced exercises, such as more repetitions of prone active middle and lower trapezius exercises and more repetitions of the other exercises. By this time we may not be utilizing heat or ice, but may include flouromethane spray with manual stretch at key areas, LASER with neuroprobe, or no modalities at all if the patient has no complaints of discomfort. For the patient with neck complaints active neck exercises may have been used and the repetitions may be increased. If the patient remains on therapy, we could further strengthen the posterior shoulder girdle by adding a cuff weight at the wrist. Increase this to patient tolerance. The goal is to wean the patient off modalities as soon as possible, get him instructed and independent in his exercise program, and instruct him in correct posture and body mechanics as soon as possible. Advanced exercises may include PNF and the Cybex when tolerated.

We should not forget that the clavicle can become hypomobile at its articulations and may contribute to compression of the vessels and brachial plexus. At the sternoclavicular joint the clavicle moves superior and inferior on the manubrium a total of about thirty degrees. It moves superiorly as the arm is lowered, and inferiorly as the arm is elevated. About sixty degrees total rotary motion occurs along the long axis of the clavicle during elevation of the arm. A total of forty-five to sixty degrees anterior-posterior glide occurs during protraction and retraction of the shoulder. At the acromioclavicular joint the angle between the scapula and the clavicle narrows as the arm is abducted and widens as it is adducted. Most rotation is noted at the sternoclavicular joint. So you can see if mobility is decreased, a jamming of structures underneath it may occur. The test position for pectoral length and trapezii strength assumes normal clavicular motion to allow arm positioning.

To mobilize the sternoclavicular (SC) joint, place the thumb on the clavicle and stabilize the thumb with the other hand. Push down with gentle oscillations. To mobilize

for superior and inferior glide, place the thumb along the top border of the clavicle near the SC joint, stabilize the thumb with the other hand and push down. It is not feasible to mobilize for rotation. To mobilize at the acromioclavicular joint (AC), stabilize the acromion with one hand and move the end of the clavicle with the other hand.

This concludes the mobilization, exercise and modality portions of the treatment. Now we should consider another essential area to include. Posture and body mechanics instruction are essential components for treatment of the thoracic outlet patient. Unless the patient understands how certain postures contribute to discomfort, and learns how to correct these on a daily basis at work and home the treatment may be unsuccessful. The patient needs to learn what poor and proper posture look like, and should practice until he learns the correct one. It is also important that the patient learn whether the job or daily activities contribute to improper posturing and poor body mechanics. For example, is the patient sitting at a desk using the typewriter or word processor all day? Is it at the proper height? What type of chair does the patient use? Another example might be an eighteen-wheel truck driver who has the arms up and forward at the steering wheel for hours as he or she drives cross-country. Or is the patient a dock worker who loads heavy boxes up into a truck all day? The list is enless and ranges from students to manual laborers to professionals. The therapist should not only question the patient closely, but perhaps even ask the patient to demonstrate the positions involved in his job. Thus, the therapist should determine which minor changes in the job environment or which body mechnanics changes by the patient can prevent future problems with thoracic outlet syndrome. Sometimes it is beneficial to instruct the patients as a group. If several patients suffer a similar problem, they can act as a support group and reinforce acceptance of the new posture and body mechanics ideas. This may also overflow to the continuation of exercises at home. It is also important that the patient understand what thoracic outlet syndrome means. Explain this to the patient in terms he or she can understand, and use a picture, skeleton, or graphic representation to supplement the explanation. If the patient understands the anatomical structures involved, how tight muscles and posture affect these structures, and why he or she is doing the exercise you prescribe, he or she is more likely to comply with the treatment.

I would now like to describe a case history of a patient who was recently treated as an outpatient for thoracic outlet symptoms. The patient was a 29 year old female who works as a computer programmer. About three weeks prior to her initial visit she started having pain in the left chest near the sternum and on the inside of the left arm. The patient complained that her fourth and fifth fingers on the left hand were numb. The patient said that approximately four weeks prior her home had been burglarized and her stress level had increased. The patient is active in sports, especially volley ball and swimming. The patient demonstrated a forward head and rounded shoulders posturally upon examination. Body mechanics were fair as the patient got on and off testing and treatment surfaces, but some improper techniques were noted.

A hyperabduction test caused a pulse dropout on the left but not on the right. On examination, the patient has a 25% decrease in pectoralis major and pectoralis minor length bilaterally. The latissimus dorsi was 20% decreased in length bilaterally. The scalenes and upper trapezii were also 25% decreased in length bilaterally. The patient had normal cervical range of motion otherwise. A manual muscle test for the upper extremities revealed normal (N) strength in everything except good (G) strength in the middle trapezius, and good minus (G-) in the lower trapezius bilaterally. Although the patient had subjective complaints of numbness and tingling in the left fingers, sensation for pin prick and light touch and temperature was intact.

Palpation of the posterior cervical and upper thoracic area revealed spasms present in the upper trapezii bilaterally. The patient complained that she felt unable to play sports or do her job well with the discomfort and sensory changes; her goal was to return to her previous level of activities in both areas without discomfort. The patient was seen three times a week for one hour sessions. At the first session the evaluation and a treatment was given. It consisted of hot packs (the patient disliked ice), followed by a moderately deep massage in sitting with the arms supported. The patient was started on gentle stretching of the scalenes and pectorals in sitting, and began five repetitions of active middle and lower trapezius exercises in the prone position.

At the end of the first week the patient was reevaluated for improvements. Improvements found were increased tolerance of deeper massages, fewer complaints of discomfort, and tolerance of increased repetitions of exercise. The

patient was also instructed further in the correct head, neck and shoulder posture both standing and sitting. The work desk height and arrangement were discussed. The patient was given a cervical roll to use for sleeping rather than the large pillow she had been using which pulled her head forward.

At the fifth treatment session the patient was no longer having the numbness or tingling in her left hand, and her posture was improving. The patient tolerated a deeper massage and ultrasound had been added to diminish the spasms. She was performing the trapezius exercises actively in prone ten repetitions each. She had also gained normal length of the pectoral muscles and had very minimal tightness in the scalenes.

On her seventh treatment the patient began prone resisted exercises with a 2 pound cuff weight at the wrist. By this time the patient demonstrated good exercise technique, and was independently doing them at home several times a day. No modalities were being used.

The patient was discharged after a total of ten treatment sessions. At discharge, no modalities were needed. Exercises were at twenty repetitions with the 2 pound cuff weight in the prone position. The middle and lower trapezii muscles had normal strength, and the pectorals and scalenes had normal length. The patient had no complaints of neck, chest or arm pain or discomfort. She had even begun swimming again, and was alternating the crawl with the backstroke successfully. The patient understood the need for continued exercises of this type since her job kept her arms up and forward much of the time. She had made some minor adjustments at her desk which helped her posture during the work day. The patient was aware of correct versus poor neck, head and shoulder posture, and was able to correct this when she found herself in her old postural habit.

This was an ideal patient. Most of her discomfort was probably a combination of stress and poor posture which led to a muscle imbalance and therefore to compression at the outlet. For this patient not many combinations of modalities were necessary because the patient showed good response. However, another patient situation might have required more ingenuity by the therapist to select the best combination of modalities to decrease the patient's discomfort so the exercise program could be emphasized. This patient was also active in sports and tolerated a quick progression of the exercise program. She was young, and was highly

motivated to comply with the exercise and posturing program at home.

This concludes the lecture-demonstration on the evaluation and treatment of thoracic outlet syndrome. It is hoped that the learners now have some additional knowledge with which to approach these patients and tailor the therapy program to each patient's needs.

APPENDIX F

EVALUATION OF THE VIDEOTAPE

VIDEOTAPE EVALUATION

Direction: Circle the appropriate response. Please write comments below in space provided and indicate the specific statement number to which the comment/s apply.

KEY:
A Strongly Agree
B Agree
C Disagree
D Strongly Disagree

A. Content

1.	The content is appropriate for the intended listener.	A	B	C	D
2.	The content is well organized	A	B	C	D
3.	The content is presented in a logical sequence.	A	B	C	D
4.	The content provides guidance for applying the knowledge or skills.	A	B	C	D
5.	The content is covered in sufficient depth.	A	B	C	D
6.	Emphasis is placed on key points.	A	B	C	D
7.	The content meets the objectives.	A	B	C	D

Comments:

B. Teaching Method

1.	The teaching method is appropriate for the content.	A	B	C	D
2.	The instructor presents as a role model.	A	B	C	D
3.	The information is clearly stated.	A	B	C	D

4. Demonstrations are inserted in the sequence logically. A B C D

Comments:

C. Technical Features

Audio

1. The instructor's voice is audible and clear. A B C D

2. The instructor's voice holds interest. A B C D

3. The voice is synchronized with the image. A B C D

4. Distracting sounds are minimal. A B C D

Comments:

Visual

1. The instructor is clearly visible. A B C D

2. Color and lighting are appropriate. A B C D

3. The camera angle is appropriate. A B C D

4. Visual aids used by the instructor are clearly visible. A B C D

5. Visual distractions are minimal. A B C D

Comments:

Length

1. The length of the tape is appropriate for the topic. A B C D

2. The tape is not too long for viewing in one sitting. A B C D

Comments:

D. Please write any other recommendations that you believe will improve the videotape in the space provided below.

E. Please check one.

____ The videotape must be redone.

____ The videotape may be used in the study as it is.

APPENDIX G

ITEM ANALYSIS OF THE VIDEOTAPE EVALUATION

ITEM ANALYSIS OF VIDEOTAPE EVALUATION

KEY: A Strongly Agree
B Agree
C Disagree
D Strongly Disagree

	A	B	C	D
A. Content				
1. The content is appropriate for the intended listener.	3	1		
2. The content is well organized.	3	1		
3. The content is presented in a logical manner.	3	1		
4. The content provides guidance for applying the knowledge or skills.	2	2		
5. The content is covered in sufficient depth.	2	2		
6. Emphasis is placed on key points.	2	2		
7. The content meets the objectives.	3	1		
B. Teaching Method	A	B	C	D
1. The teaching method is appropriate for the content.	3	1		
2. The instructor presents as a role model.	2	1		
3. The information is clearly stated.	1	3		
4. Demonstrations are inserted in the sequence logically.	4			
C. Technical Features				
Audio	A	B	C	D
1. The instructor's voice is audible and clear.	3	1		

2. The instructor's voice holds interest.			3	1
3. The voice is synchronized with the image.		2	2	
4. Distracting sounds are minimal.		2	2	
Visual	A	B	C	D
1. The instructor is clearly visible.		1	3	
2. Color and lighting are appropriate.		1	2	1
3. The camera angle is approprate.		1	3	
4. Visual aids used by the instructor are clearly visible.		1	3	
5. Visual distractions are minimal.		3	1	
Length	A	B	C	D
1. The length of the tape is appropriate for the topic.			4	
2. The tape is not too long for viewing in one sitting.			3	1

The videotape must be redone. 1

The videotape may be used in the study as it is. 3

APPENDIX H

SUMMARY OF EXPERT COMMENTS ON THE VIDEOTAPE EVALUATION

SUMMARY OF EXPERT COMMENTS ON VIDEOTAPE

A. Content

Unclear about one demonstraton on mobilization of the clavicle and the forces described.

Could use a summary for each section that included application of knowledge or skill.

Could use more explanation of various treatment skills.

Perhaps recap each main topic so main points are reinforced.

Good transition from one subject to the next.

Effective use of slides to reinforce content.

Possibly content is too sufficiently covered for one videotape.

B. Teaching Method

Informaton is clearly stated.

Instructor should slow down.

Instructor became more relaxed as tape progressed.

Good use of variety of visual aids.

C. Technical Features

Audio Instructor's voice somewhat tense.

Consistent inflection in instructor's voice would help.

Instructor should slow down.

Visual Some problems with shadows.

The camera was slow to follow the lecturer in some instances.

Lighting a little dark on the instructor.

Could be shortened or viewed in two sessions.

Other Recommendations

Use samples of treatment techniques or visuals of these to break up some of the lecture segments.

Explore decreasing tape length.

APPENDIX I

PRETEST

PRETEST

Thoracic Outlet Syndrome

Directions: Circle the best answer.

1. The definition of thoracic outlet syndrome is:

   a. Compression of the brachial plexus and axillary artery and vein by the pectoralis minor muscle
   b. Compression of the brachial nerve, artery and vein between the clavicle and first rib
   c. Compression of the brachial plexus and the subclavian artery and vein by the scalene muscles
   d. Compression of the brachial plexus and the subclavian artery and vein by any of the structures listed above

2. Which of the following muscles is most often the cause of thoracic outlet syndrome?

   a. Pectoralis major
   b. Scalenes
   c. Latissimus dorsi
   d. Pectoralis minor

3. Which electromyographic nerve conduction velocity indicates a thoracic outlet syndrome?

   a. 57.8 meters per second
   b. 72.2 meters per second
   c. 81.1 meters per second
   d. 90.1 meters per second

4. Which tests are indicative of thoracic outlet syndrome if they cause symptoms to occur?

   a. Hyperextension test of the upper extremity, forced shoulder protraction, and flexion and abduction of the arm overhead
   b. Hyperextension test of the upper extremity, forced shoulder depression, and flexion and abduction of the arm overhead
   c. Hyperextension test of the upper extremity, forced shoulder depression, and abduction with internal rotation of the upper extremity
   d. Forced shoulder depression, flexion and abduction of the arm overhead, and external rotation of the upper extremity

5. Common patient complaints with thoracic outlet syndrome include:

   a. Anterior chest pain, radiating pain down the arm to the last 2 fingers, and numbness or tingling in the arm or hand
   b. Anterior chest pain, numbness or tingling in the arm or hand, and radiating pain in the scapula
   c. Posterior chest pain, numbness or tingling in the upper trapezii, and pain radiating into the last 2 fingers
   d. Numbness or tingling in the middle 2 fingers, radiating pain in the arm or hand, lateral chest pain

6. Another name for thoracic outlet syndrome is:

   a. Adson's syndrome
   b. Wernicke's syndrome
   c. Hyperabduction syndrome
   d. Scalene anticus syndrome

7. Which of the following nervous structures is most often constricted in thoracic outlet syndrome?

   a. Ulnar nerve
   b. Median nerve
   c. Long thoracic nerve
   d. Radial nerve

8. What structures form the famous thoracic outlet triangle?

   a. First rib and clavicle
   b. Pectoralis minor muscle and the ribs
   c. Scalene muscles and the first rib
   d. Sternocleidomastoid muscle and the clavicle

9. Evaluation of the patient suspected of having a thoracic outlet syndrome should include which of the following?

   a. Muscle length, muscle strength, motor and coordination
   b. Muscle strength, motor and coordination, positional replication of symptoms
   c. Muscle length, motor and coordination, positional replication of symptoms
   d. Muscle length, muscle strength, positional replicaton of symptoms

10. Thoracic outlet syndrome can be brought about by which of the following?

    a. Excessive hypermobility of the interscalene triangle
    b. An imbalance of muscle length and strength at the shoulder girdle
    c. Atrophy of the scalene muscles
    d. Hypermobility of the acromioclavicular ligament

11. It is most appropriate to check the length of which of the following muscles when evaluating the patient for thoracic outlet syndrome?

    a. Pectineus, suprahyoid, and subscapularis
    b. Levator scapulae, sternocleidomastoid, and pectoralis major
    c. Pectoralis minor, latissimus dorsi, and scalenes
    d. Trapezii, scalenes, and supraspinatus

12. The thoracic outlet patient may have which of the following complaints?

    a. Numbness and tingling in the last 2 fingers
    b. Tightness in the posterior shoulder girdle
    c. Pain at the lower border of the ribs
    d. Pain in the serratus muscle

13. Which of the following treatment progressions is the most logical for a patient with thoracic outlet problems? (Listed left to right in order of importance).

    a. Stretch tight muscles, modalities to control pain, strengthen weak muscles
    b. Postural instruction, strengthen weak muscles, modalities for pain control
    c. Pain control with modalities, stretch tight muscles, strengthen weak muscles
    d. Strengthen weak muscles, modalities to control pain, stretch tight muscles

14. Which of the following joints may be appropriate to mobilize in a patient with thoracic outlet syndrome?

    a. Glenohumeral
    b. Sternocostal
    c. Scapulohumeral
    d. Sternoclavicular

15. Agnes Acute presents with complaints of headaches, tingling in both hands when her arms are forward at chest level or above, and chest pain. Which of the following are priority areas to test on an initial evaluation of Anges?

    Circle the two (2) best answers.

    a. Length of the rhomboid muscles
    b. Strength of the middle and lower trapezii muscles
    c. Strength of the pectoralis major and minor
    d. Length of the pectoralis, scalene and latissimus dorsi muscle

16. Peter Pain is a dock worker who comes to you with complaints of chest pain, and numbness and tingling in both hands which is especially noticeable in the last 2 fingers. He also complains that he feels like his hands and arms are weaker, and that he is unable to turn his head as much as usual. Which of the tests listed below would you include in your evaluation of Peter?

    a. Sensation of the upper extremities, cervical range of motion, length of the pectoralis minor and latissimus muscles, strength of the upper extremities, Adson's test
    b. Strength of the pectoralis muscles, length of the middle and lower trapezii, sensation of the upper extremities, cervical range of motion, Wernicke's test
    c. Length of pectoral muscles, cervical range of motion, sensation of the upper extremities, strength of the posterior shoulder girdle muscles, strength of the upper extremities, Adson's test
    d. Sensation of the upper extremities, cervical range of motion, strength of the upper extremities and latissimus dorsi muscles, length of the posterior shoulder girdle muscles, Wernicke's test

19. Oliver Outlet is a 37 year old man who has had chronic symptoms of thoracic outlet syndrome inconsistently over the past 2 years. He received hot packs and active neck exercises in therapy in the past, and had temporary relief. Oliver drives an eighteen-wheel diesel truck, and is now back for more therapy. His pectoral muscles are 20% tight, and his posterior shoulder girdle muscles are poor (P) strength. Out of the choices given below, which of the following would be best to include in your treatment to Oliver?

    a. Ice or hot packs to the neck and upper back, LASER-EMS to outlet points, active neck exercises, prone active posterior shoulder girdle exercises, postural instruction and correction, and biomechanics instruction in a group class
    b. Ice or hot packs to the neck, ultrasound, prone active posterior shoulder girdle exercises, active neck exercises
    c. Ice or hot packs to the neck, flouromethane spray and stretch, LASER-EMS to outlet points, supine isometric posterior shoulder girdle exercises, postural instruction and correction
    d. Ice or hot packs to the neck, ultrasound, sitting posterior shoulder girdle exercises

20. Postural instruction for the thoracic outlet patient is:

    a. Indicated only for patients who have manual labor jobs
    b. Indicated for comprehensive patient care
    c. Indicated to help prevent further problems
    d. Not indicated

APPENDIX J

POSTTEST 1

POSTTEST

Thoracic Outlet Syndrome

Directions: Circle the best answer.

1. Which of the following indicate thoracic outlet syndrome?

   a. Positive Adson's test, nerve conduction velocity of 56, positive Wernicke's test
   b. Positive Adson's test, decreased or obliterated radial pulse with the arm overhead, nerve conduction velocity of 56
   c. Decreased or obliterated radial pulse with the arm overhead, nerve conduction velocity of 56, positive Wernicke's test
   d. Postive Adson's test, decreased or obliterated radial pulse with the arm overhead, positive Wernicke's test

2. Thoracic outlet syndrome can be defined as:

   a. Compression of the neuro-vascular bundle by the scalene muscles, between the ribs and the pectoralis minor muscle, or by the sternocleidomastoid muscle
   b. Compression of the neuro-vascular bundle between the first rib and the clavicle, between the ribs and the pectoralis minor muscle, or by the sternocleidomastoid muscle
   c. Compression of the neuro-vascular bundle by the scalene muscles, between the first rib and the clavicle, or by the sternocleidomastoid muscle
   d. Compression of the neuro-vascular bundle by the scalene muscles, between the first rib and the clavicle, or between the ribs and the pectoralis minor muscle

3. A thoracic outlet patient may have which of the complaints listed below?

   a. Pain in the anterior chest area, numbness in the posterior shoulder girdle, numbness in the last two fingers
   b. Pain in the deltoid muscle, numbness in the posterior shoulder girdle,numbness in the last two fingers
   c. Pain in the anterior chest area, pain in the deltoid muscle, numbness in the last two fingers
   d. Pain in the anterior chest area, pain in the deltoid muscle, numbness in the posterior shoulder girdle

4. The thoracic outlet triangle is formed by which structures?

   a. Pectoralis minor muscle and the ribs
   b. Sternocleidomastoid muscle and the clavicle
   c. First rib and the clavicle
   d. Scalene muscles and the first rib

5. Which of the following nerves is most frequently symptomatic in patients with thoracic outlet syndrome?

   a. Radial
   b. Median
   c. Ulnar
   d. Long Thoracic

6. Which nerve conduction velocity indicates a possible thoracic outlet syndrome?

   a. 56.7 meters/second
   b. 69.1 meters/second
   c. 72.5 meters/second
   d. 82.3 meters/second

7. Thoracic outlet syndrome is also called:

   a. Wernicke's syndrome
   b. Homan's syndrome
   c. Hyperabduction syndrome
   d. Scalene anticus syndrome

8. Which of the following contribute to a thoracic outlet problem?

   a. Malformation of clavicle or first rib, prolonged posture of forward head and rounded shoulders, hypertrophy of the subscapularis muscle
   b. Malformation of clavicle or first rib, tight and strong pectoral muscles and elongated and weak trapezii muscles, hypertrophy of the subscapularis muscle
   c. Prolonged posture of forward head and rounded shoulders, tight and strong pectoral muscles and elongated and weak trapezii muscles, malformation of clavicle or first rib
   d. Prolonged posture of forward head and rounded shoulders, tight and strong pectoral muscles and elongated and weak trapezii muscles, hypertrophy of the subscapularis muscle

9. Which tests may indicate thoracic outlet problems if they cause replication of symptoms?

   a. Hyperextension test of the upper extremity, forced shoulder depression, or flexion and abduction of the arm overhead
   b. Hyperextension tests of the upper extremity, flexion and abduction of the arm overhead, and forced shoulder protraction
   c. Forced shoulder depression, hyperextension of the upper extremity, or abduction with internal rotation of the upper extremity
   d. Forced shoulder depression, flexion and abduction of the arm overhead, and external rotation of the upper extremity

10. Why is evaluation of a patient with thoracic outlet syndrome important?

   a. To determine muscular imbalance, sensory involvement, or to develop a treatment and exercise program
   b. To determine muscular imbalance, sensory involvement, or presence of muscle spasticity
   c. To determine sensory involvement, presence of muscle spasticity, or to develop a treatment and exercise program
   d. To determine muscular imbalance, presence of muscle spasticity, or to develop a treatment and exercise program

11. It is most important to check the length of which of the muscles listed below when evaluating a patient with thoracic outlet syndrome?

    a. Trapezii
    b. Scaleni
    c. Serratus anterior
    d. Subclavius

12. Which should the physical therapist evaluate on patients suspected of having thoracic outlet problems?

    a. Sensation of the upper extremities, mobility of the sternocostal joint, length of the pectoralis, latissimus dorsi and scalene muscles
    b. Length of the pectoralis, latissimus dorsi and scalene muscles, mobility of the sternocostal joint, strength of the upper extremity and middle and lower trapezii
    c. Strength of the upper extremity and the middle and lower trapezii, length of the pectoralis, latissimus dorsi and scalene muscles, sensation of the upper extremities
    d. Sensation of the upper extemities, mobility of the sternocostal joint, length of the pectoralis, latissimus dorsi and scalene muscles

13. What joint of those listed below might be appropriate to mobilize in a patient with thoracic outlet problems?

    a. Costoclavicular
    b. Sternocostal
    c. Glenohumeral
    d. Sternoclavicular

14. Which treatment listed below is the most logical for a patient with thoracic problems? (Listed left to right in order of importance)

    a. Pain control with modalities, stretch tight muscles, strengthen weak muscles
    b. Stretch tight muscles, modalities to control pain, strengthen weak muscles
    c. Postural instruction, strengthen weak muscles, modalities to control pain
    d. Strengthen weak muscles, modalities to control pain, stretch tight muscles

15. Sally Secretary complains of headaches, chest pain and tingling in both hands when her arms are near shoulder level or above. Which of following are priority areas to test on an initial evaluation of Sally? Assume the patient cooperates with the tests. Circle the two (2) best answers.

    a. Length of the pectoralis, scalene, and latissimus dorsi muscles
    b. Length of the rhomboid muscles
    c. Sensation of the patient's arm
    d. Strength of the middle and lower trapezii muscles

16. A patient presents with numbness and tingling in the arm, complaints of tenderness with light palpation along the pectoralis and cervical extensors, chest pain, and decreased cervical range of motion. Upon further evaluation, the patient has P+ strength in the middle trapezius, P- strength in the lower trapezius, and normal strength in the pectoralis major and minor. The scalenes and the pectorals are 50% tight. You are with the patient for the first treatment post evaluation. Which treatment of those listed below would be best to begin with initially?

    a. Hot packs, ultrasound, LASER-EMS, with prone posterior shoulder girdle exercises
    b. Ice packs, ultrasound, LASER-EMS, with supine isometric posterior shoulder girdle exercises
    c. Ice packs, flouromethane spray and stretch, ultrasound, with prone resisted posterior shoulder girdle exercises
    d. Hot packs, flouromethane spray and stretch, ultrasound, with sitting active posterior shoulder girdle exercises

17. Olga Outlet's complaints include the following: Tingling of the fourth and fifth fingers on the right hand, a decreased ability to move her head, and tenderness in the anterior and posterior shoulder girdle areas when moving or getting dressed. Which of the following would you test on Olga in this first session?

    a. Sensation of the upper extremities, cervical range of motion, strength of the pectoral muscles, length of the trapezii muscles, Adson's test
    b. Sensation of the upper extremities, strength of the trapezii muscles, length of the pectoralis minor and latissimus dorsi muscles, cervical range of motion, Adson's test
    c. Strength of the pectoral muscles, cervical range of motion, strength of the middle and lower trapezii, Wernicke's test
    d. Sensation of the upper extremities, length of the trapezii muscles, length of the pectoral muscles, cervical range of motion

18. Olga has now attended 6 therapy sessions. She has been tolerating a treatment program of ice to the neck, ultrasound to tender points, LASER-EMS, active neck exercises, and supine posterior shoulder girdle exercises. She now has minimal pain and no replication of symptoms. Her cervical range of motion is now only 25% decreased and the pectoral muscles are only 25% decreased in length. From the information given in the lecture, to which of the following protocols below would you progress Olga?

    a. LASER-EMS, increased repetitions of active neck exercises, and increased repetitions of supine isometric posterior shoulder girdle exercises
    b. Ultrasound to trigger points, no active neck exercises, sitting posterior shoulder girdle exercises
    c. LASER-EMS, increased repetitions of active neck exercises, and prone active posterior shoulder girdle exercises
    d. Ultrasound to trigger points, decreased active neck exercises, prone resistive posterior shoulder girdle exercises with a 2 pound weight

19. Calvin Chronic is a diesel truck driver who had 2 previous episodes of thoracic outlet syndrome problems in the last 2 years. He is now presenting with the symptoms again and is to start therapy as an outpatient. His evaluation results include chest pain and numbness in both hands in his last 2 fingers, a forward head and rounded shoulders, P- strength in the middle and lower trapezii, normal arm strength, and 60% decrease in cervical rotation, extension, and lateral flexion. He feels unsafe to drive with these problems and wants to improve as quickly as possible. Based on information given in the lecture, choose the best exercise protocol for Calvin, and the one that is the most time efficient of those listed below.

    a. Hot packs to the neck and upper back, ultrasound, LASER-EMS, prone active posterior shoulder girdle exercises with weights, postural correction and body mechanics instruction
    b. Hot packs to the neck and upper back, active neck exercises and prone active posterior shoulder girdle exercises, instruct in home exercise program, attend group posture and body mechanics class
    c. Hot packs to the neck area, LASER-EMS, ultrasound, active neck exercises, and sitting active posterior shoulder girdle exercises
    d. Hot packs to the neck area, LASER-EMS, active neck exercises, prone posterior shoulder girdle exercises, instruct in a home program of exercises, and have patient attend a group class on posture and body mechanics

20. Postural instruction for a patient who has thoracic outlet syndrome should:

    a. Be included in the treatment as soon as possible to help prevent trouble in the future
    b. Only be included in the treatment when the patient has had more than one painful episode
    c. Not be included
    d. Be included to show that the therapist is comprehensive in program planning

APPENDIX K

POSTTEST 2

POSTTEST TWO

Thoracic Outlet Syndrome

Directions: Circle the best answer.

1. A thoracic outlet patient may have which of the complaints listed below?

   a. Pain in the anterior chest area, numbness in the posterior shoulder girdle, numbness in the last two fingers
   b. Pain in the deltoid muscle, numbness in the posterior shoulder girdle, numbness in the last two fingers
   c. Pain in the anterior chest area, pain in the deltoid muscle, numbness in the last two fingers
   d. Pain in the anterior chest area, pain in the deltoid muscle, numbness in the posterior shoulder girdle

2. Which of the following indicate thoracic outlet syndrome?

   a. Positive Adson's test, nerve conduction velocity of 56, positive Wernicke's test
   b. Positive Adson's test, decreased or obliterated radial pulse with the arm overhead, nerve conduction velocity of 56
   c. Decreased or obliterated radial pulse with the arm overhead, nerve conduction velocity of 56, positive Wernicke's test
   d. Positive Adson's test, decreased or obliterated radial pulse with the arm overhead, positive Wernicke's test

3. The thoracic outlet triangle is formed by which structures?

   a. Pectoralis minor muscle and the ribs
   b. Sternocleidomastoid muscle and the clavicle
   c. First rib and the clavicle
   d. Scalene muscles and the first rib

4. Which nerve conduction velocity indicates a possible thoracic outlet syndrome?

   a. 56.7 meters/second
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   d. 82.3 meters/second

5. Thoracic outlet syndrome can be defined as:

   a. Compression of the neuro-vascular bundle by the scalene muscles, between the ribs and the pectoralis minor muscle, or by the sternocleidomastoid muscle
   b. Compression of the neuro-vascular bundle between the first rib and the clavicle, between the ribs and the pectoralis minor muscle, or by the sternocleidomastoid muscle
   c. Compression of the neuro-vascular bundle by the scalene muscles, between the first rib and the clavicle, or by the sternocleidomastoid muscle
   d. Compression of the neuro-vascular bundle by the scalene muscles, between the first rib and the clavicle, or between the ribs and the pectoralis minor muscle

6. Which of the following nerves is most frequently symptomatic in patients with thoracic outlet syndrome?

   a. Radial
   b. Median
   c. Ulnar
   d. Long Thoracic

7. Thoracic outlet syndrome is also called:

   a. Wernicke's syndrome
   b. Homan's syndrome
   c. Hyperabduction syndrome
   d. Scalene anticus syndrome

8. Which tests may indicate thoracic outlet problems if they cause replication of symptoms?

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   c. Forced shoulder depression, hyperextension of the upper extremity, or abduction with internal rotation of the upper extremity
   d. Forced shoulder depression, flexion and abduction of the arm overhead, and external rotation of the upper extremity

9. Which of the following contribute to a thoracic outlet problem?

   a. Malformation of clavicle or first rib, prolonged posture of forward head and rounded shoulders, hypertrophy of the subscapularis muscle
   b. Malformation of clavicle or first rib, tight and strong pectoral muscles and elongated and weak trapezii muscles, hypertrophy of the subscapularis muscle
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10. It is most important to check the length of which of the muscles listed below when evaluating a patient with thoracic outlet syndrome?

   a. Trapezii
   b. Scaleni
   c. Serratus anterior
   d. Subclavius

11. Why is evaluation of a patient with thoracic outlet syndrome important?

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   c. To determine sensory involvement, presence of muscle spasticity, or to develop a treatment and exercise program
   d. To determine muscular imbalance, presence of muscle spasticity, or to develop a treatment and exercise program

12. What joint of those listed below might be appropriate to mobilize in a patient with thoracic outlet problems?

   a. Costoclavicular
   b. Sternocostal
   c. Glenohumeral
   d. Sternoclavicular

13. Which should the physical therapist evaluate on patients suspected of having thoracic outlet problems?

    a. Sensation of the upper extremities, mobility of the sternocostal joint, length of the pectoralis, latissimus dorsi and scalene muscles
    b. Length of the pectoralis, latissimus dorsi and scalene muscles, mobility of the sternocostal joint, strength of the upper extremity and middle and lower trapezii
    c. Strength of the upper extremity and the middle and lower trapezii, length of the pectoralis, latissimus dorsi and scalene muscles, sensation of the upper extremities
    d. Sensation of the upper extremities, mobility of the sternocostal joint, length of the pectoralis, latissimus dorsi and scalene muscles

14. Which treatment listed below is the most logical for a patient with thoracic problems? (Listed left to right in order of importance)

    a. Pain control with modalities, stretch tight muscles, strengthen weak muscles
    b. Stretch tight muscles, modalities to control pain, strengthen weak muscles
    c. Postural instruction, strengthen weak muscles, modalities to control pain
    d. Strengthen weak muscles, modalities to control pain, stretch tight muscles

15. Postural instruction for a patient who has thoracic outlet syndrome should:

    a. Be included in the treatment as soon as possible to help prevent trouble in the future
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    a. Length of the pectoralis, scalene, and latissimus dorsi muscles
    b. Length of the rhomboid muscles
    c. Sensation of the patient's arm
    d. Strength of the middle and lower trapezii muscles

17. Olga Outlet's complaints include the following: Tingling of the fourth and fifth fingers on the right hand, a decreased ability to move her head, and tenderness in the anterior and posterior shoulder girdle areas when moving or getting dressed. Which of the following would you test on Olga in this first session?

    a. Sensation of the upper extremities, cervical range of motion, strength of the pectoral muscles, length of the trapezii muscles, Adson's test
    b. Sensation of the upper extremities, strength of the trapezii muscles, length of the pectoralis minor and latissimus dorsi muscles, cervical range of motion, Adson's test
    c. Strength of the pectoral muscles, cervical range of motion, strength of the middle and lower trapezii, Wernicke's test
    d. Sensation of the upper extremities, length of the trapezii muscles, length of the pectoral muscles, cervical range of motion

18. Olga has now attended 6 therapy sessions. She has been tolerating a treatment program of ice to the neck, ultrasound to tender points, LASER-EMS, active neck exercises, and supine posterior shoulder girdle exercises. She now has minimal pain and no replication of symptoms. Her cervical range of motion is now only 25% decreased and the pectoral muscles are only 25% decreased in length. From the information given in the lecture, to which of the following protocols below would you progress Olga?

    a. LASER-EMS, increased repetitions of active neck exercises, and increased repetitions of supine isometric posterior shoulder girdle exercises
    b. Ultrasound to trigger points, no active neck exercises, sitting posterior shoulder girdle exercises
    c. LASER-EMS, increased repetitions of active neck exercises, and prone active posterior shoulder girdle exercises
    d. Ultrasound to trigger points, decreased active neck exercises, prone resistive posterior shoulder girdle exercises with a 2 pound weight

19. A patient presents with numbness and tingling in the arm, complaints of tenderness with light palpation along the pectoralis and cervical extensors, chest pain, and decreased cervical range of motion. Upon further evaluation, the patient has P+ strength in the middle trapezius, P- strength in the lower trapezius, and normal strength in the pectoralis major and minor. The scalenes and the pectorals are 50% tight. You are with the patient for the first treatment post evaluation. Which treatment of those listed below would be best to begin with initially?

    a. Hot packs, ultrasound, LASER-EMS, with prone posterior shoulder girdle exercises
    b. Ice packs, ultrasound, LASER-EMS, with supine isometric posterior shoulder girdle exercises
    c. Ice packs, flouromethane spray and stretch, ultrasound, with prone resisted posterior shoulder girdle exercises
    d. Hot packs, flouromethane spray and stretch, ultrasound, with sitting active posterior shoulder girdle exercises

20. Calvin Chronic is a diesel truck driver who had 2 previous episodes of thoracic outlet syndrome problems in the last 2 years. He is now presenting with the symptoms again and is to start therapy as an outpatient. His evaluation results include chest pain and numbness in both hands in his last 2 fingers, a forward head and rounded shoulders, P- strength in the middle and lower trapezii, normal arm strength, and 60% decrease in cervical rotation, extension, and lateral flexion. He feels unsafe to drive with these problems and wants to improve as quickly as possible. Based on information given in the lecture, choose the best exercise protocol for Calvin, and the one that is the most time efficient of those listed below.

    a. Hot packs to the neck and upper back, ultrasound, LASER-EMS, prone active posterior shoulder girdle exercises with weights, postural correction and body mechanics instruction
    b. Hot packs to the neck and upper back, active neck exercises and prone active posterior shoulder girdle exercises, instruct in home exercise program, attend group posture and body mechanics class
    c. Hot packs to the neck area, LASER-EMS, ultrasound, active neck exercises, and sitting active posterior shoulder girdle exercises
    d. Hot packs to the neck area, LASER-EMS, active neck exercises, prone posterior shoulder girdle exercises, instruct in a home program of exercises, and have patient attend a group class on posture and body mechanics

APPENDIX L

PRETEST DEMOGRAPHIC COVER SHEET

DEMOGRAPHIC DATA

Date Today _____

Age _____

Sex (x) __Female __Male

Nationality (x) __Black __White __Hispanic __Oriental

Years to date in College _____

Degree(s) already held _____

Degree currently seeking _____

Are you currently employed? (x) __yes __no

If so, how many hours per week? _____

What is the work classification? (x) __Blue collar __Clerical __Professional

What is the work classification of your parents or guardian?

(x) __Blue collar __Clerical __Professional

Thank you for completing this data sheet.

APPENDIX M

ANSWER KEY FOR PRETEST, POSTTEST 1, AND POSTTEST 2

PRETEST AND POSTTEST KEY

PRETEST	POSTTEST 1	POSTTEST 2
1. d	1. b	1. c
2. b	2. d	2. b
3. a	3. c	3. d
4. b	4. d	4. a
5. a	5. c	5. d
6. d	6. a	6. c
7. a	7. d	7. d
8. c	8. c	8. a
9. d	9. a	9. c
10. b	10. a	10. b
11. c	11. b	11. a
12. a	12. c	12. d
13. c	13. d	13. c
14. d	14. a	14. a
15. b,d	15. a,d	15. a
16. c	16. b	16. a,d
17. a	17. b	17. b
18. d	18. c	18. c
19. a	19. d	19. b
20. c	20. a	20. d

APPENDIX N

LETTER OF PERMISSION TO CONDUCT THE PILOT STUDY AT THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT DALLAS

The University of Texas
Health Science Center
at Dallas

Department of Physical Therapy
(214) 688-2850

School of Allied Health Sciences

March 5, 1986

Barb Woodall
Clinical Education Coordinator
Baylor University Medical Center
Physical Medicine & Rehab
3500 Gaston Avenue
Dallas, Texas 75246

Dear Barb:

I talked to the faculty and they agreed it would be fine for you to run your pilot study with our students. The best time appears to be March 26 from 5:00 - 6:30. p.m.

I will ask for volunteers and send you a list of names. I will reserve our VCR and two regular classrooms. It should be interesting to see how the students do!

I'll meet you at 4:30 on March 26. Good luck!

Sincerely,

Judy Hembree
Academic Coordinator of Clinical Education
Department of Physical Therapy

JH:lp

5323 Harry Hines Boulevard Dallas, Texas 75235

APPENDIX O

PILOT STUDY DEMOGRAPHIC DATA SUMMARY

Pilot Study Demographic Data Summary

Type of Instruction	Number of Participants	Age	Sex	Ethnic Origin	Years in College	Degrees Held
Videotape	1	23	F	Hispanic	4.5	-
	2	26	F	White	5.0	-
	3	22	F	White	5.0	B.S.
	4	25	M	White	6.0	
	5	30	F	White	6.0	B.A.
	6	21	F	White	4.0	-
	7	25	M	Oriental	4.5	-
SUMMARY				1 Hispanic		
		21	5F	1 Oriental	4.0 -	2 of
		to				
	N = 7	30	2M	5 White	6.0	7
Teacher Presented	8	34	M	Hispanic	15.0	B.A. M.S.
	9	21	F	White	4.0	-
	10	22	F	White	4.0	-
	11	23	F	White	4.0	-
	12	24	F	White	4.5	Health Ed.
	13	22	M	Hispanic	5.0	-
	14	33	M	White	5.0	B.S.
SUMMARY		21	4F	2 Hispanic	4.0 -	3 of
		to				
	N = 7	34	3M	5 White	15.0	7

Pilot Study Demographic Data Summary, cont'd.

Degrees Seeking	Current Employment	Hrs Worked Per Week	Work Classifcation	Work Classification of Parents
B.S.P.T.	No	-	-	-
B.S.P.T.	No	-	-	Professional
B.S.P.T.	No	-	-	Professional
B.S.P.T.	No	-	-	Professional
B.S.P.T	No	-	-	Blue Collar
B.S.P.T.	No	-	-	Professional
B.S.P.T.	No	-	-	Blue Collar
All B.S.P.T.	0	0	0	2 Blue Collar 4 Professional 1 No Answer
B.S.P.T.	No	-	-	Blue Collar
B.S.P.T.	No	-	-	Professional
B.S.P.T.	No	-	-	Professional
B.S.P.T.	Yes	8.0	Professional	Professional
B.S.P.T.	No	-	-	Professional
B.S.P.T.	No	-	-	Blue Collar
B.S.P.T.	Yes	2.0	Professional	Blue Collar
All B.S.P.T.	2 of 7	2.0 - 8.0	2 Professional	3 Blue Collar 4 Professional

APPENDIX P

RAW TEST SCORES, MEANS, RANGES, AND STANDARD DEVIATIONS OF THE SCORES FOR THE VIDEOTAPE AND TEACHER PRESENTED GROUPS IN THE PILOT STUDY

Raw Test Scores, Means, Ranges and Standard Deviations of the Scores for the Videotape and Teacher Presented Groups in the Pilot Study

Type of Instruction	Number of Participant	Pretest Scores	Posttest 1 Scores	Posttest 2 Scores
Videotape	1	9.0	19.0	13.0
	2	10.0	18.0	16.0
	3	15.0	16.0	11.0
	4	15.0	18.0	17.0
	5	13.0	15.0	18.0
	6	16.0	18.0	18.0
	7	10.0	16.0	18.0
Means		12.571	17.142	15.857
Ranges		9 to 16	15 to 19	11 to 18
Standard Deviation		2.878	1.464	2.795

Note: Maximum Score = 20

Raw Test Scores, Means, Ranges and Standard Deviations of the Scores for the Videotape and Teacher Presented Groups in the Pilot Study

Type of Instruction	Number of Participant	Pretest Scores	Posttest 1 Scores	Posttest 2 Scores
Teacher Presented	8	11.0	16.0	16.0
	9	6.0	11.0	10.0
	10	14.0	15.0	16.0
	11	12.0	19.0	16.0
	12	5.0	15.0	11.0
	13	15.0	17.0	13.0
	14	10.0	19.0	19.0
Means		10.285	16.000	14.428
Ranges		6 to 14	11 to 19	10 to 19
Standard Deviation		3.592	2.769	3.207

Note: Maximum Score = 20