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PHYSICAL THERAPY PATIENT EDUCATION FOR THE MANAGEMENT OF A LOW BACK DERANGEMENT SYNDROME

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Ute H. Breese
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DEDICATION

This dissertation is dedicated in memory of my husband, John Franklin Breese, with love.

Thank you for all the special memories.

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I wish to thank all those who helped me complete my Doctor of Philosophy degree in Education. I would like to thank Dr. French for his guidance through the research process. I would like to thank my doctoral committee for their suggestions and for serving on my committee. I would also like to thank all the physical therapists and educators who helped me along the way.

Lastly, I would like to thank my parents, Bruno and Lisa Hohenfeld, for their love and encouragement throughout the years. I would also like to thank my son Bryan, and Norma, Linda, Ed, and the rest of the family for their love and support.

Abstract

The purpose of this study was to identify the content and design of physical therapy patient education programs recommended in the literature and to assess the consistency between those recommendations, the recommendations of physical therapy educators and the practices of physical therapist clinicians. A patient example was used as the focus of the patient education program. The patient example was classified as having a low back derangement syndrome.

A national sample of 600 physical therapists was surveyed, and physical therapy educators from 20 professional education programs were interviewed. The surveys yielded data from 264 physical therapists, and 31 educators in physical therapy professional education programs were interviewed.

The majority of research findings are equivocal or based on the management of nonspecific low back pain, and professional practice standards are consensus-based. As a result, definitive conclusions cannot not be drawn regarding an optimum patient education program for a low back derangement syndrome, and the major contribution of this study is a description of current practices.

Although research support is mixed, a few patient education topics and teaching methods are suggested by all three data sources (literature, practicing physical therapists and physical therapy educators). These topics include education in the current condition and its risk factors; activity modification; posture/positioning; and patient-specific directional preference exercises. Teaching methods include individual training, verbal instruction and verbal instruction in conjunction with other methods.

Principles from adult education may prove beneficial to the patient education program. Among these is the development of a collaborative relationship between the physical therapist and the patient/client. Also important is to dispel patients' fears and misconceptions, and to promote self-care of the low back condition.

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CHAPTER 1: INTRODUCTION

Background

The communication between health care provider and patient has long been considered important to the art of healing. Many aspects of patient care require the physician or health care professional to offer some form of patient education or instructions.[1] A review of historical records supports this idea.

In Ancient Greece, Hippocrates, the "father of medicine," is credited with the following adage in the Aphorisms of Hippocrates:

> Life is short and the Art long; the occasion fleeting; experience fallacious, and judgment difficult. The physician must not only be prepared to do what is right himself, but also to make the patient, the attendants, and externals co-operate (Magner, 1992, p. 15).

The implication is that there is more to health care than solely the actions of the physician. The adage acknowledges the necessary link between the physician's treatment and the patient/caregiver education; in other words, the treatment cannot stand alone without the corresponding instructions.

Among the earliest written references to medical practice are the Egyptian papyri, dating from 1900 B.C. to 1550 B.C. In the references, the healer is advised to tell the

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[1] For the purposes of this investigation, the terms 'patient education,' 'patient instructions,' 'patient/client-related instruction,' 'training,' 'advice' or 'counseling' are considered synonymous and will refer to the communication between health care provider and patient for the following purposes: 1) discussion about the health condition, 2) discussion/training regarding management of the health condition and 3) collaboration in the setting of individualized care plans and treatment goals. This communication may occur on an informal basis or as part of a formal, structured educational program. This communication may occur through the use of a variety of delivery methods, including verbal, individualized handout, pre-published material, computer or video program or individual training. Further description of the content and delivery methods of patient education are provided in the Definitions section of Chapter 1.

patient the diagnosis and state the intention to treat the patient. For example, for instructions concerning a dislocation of the mandible, the references state that the healer should tell the patient: "one having a dislocation in his mandible. An ailment which I will treat" (Clendening 1960 p. 3). The reference goes on to explain the method of treatment. The author's perception of the importance of these instructions can be inferred by their inclusion in the treatment recommendations.

On a final note, further support may be found in the traditional medicine of India, known as Ayurveda. The four pillars of Ayurvedic medicine are the physician, the medicine, the attendant and the patient. In a kind of indirect acknowledgement of the importance of the patient's participation with treatment, Ayurvedic medicine emphasized "...for the physician to assess his patient and his assistant carefully, because when therapy was unsuccessful only the physician's competence would be questioned" (Clendening, 1960, p. 41). Although historically there are examples supporting patient education in health care, what are the reasons it is considered important? An exploration of suggested reasons for its importance will give a theoretical foundation to the use of patient education.

One of the reasons patient education is considered important may be a notion that was touched upon earlier: the realization that effective management of many health conditions requires a larger strategy than solely the management of the acute health care situation (Cluff, 1981). Historical records point to the concept that the patient's cooperation is vital to success. The United States' nationwide health promotion and disease prevention agenda, the Healthy People 2010 Initiative (U.S. Department of Health and Human Services, 2000), recognizes that determinants of health include a

number of factors, including individual behaviors. To the extent that individual patient behaviors may influence health outcomes, health care providers may seek to influence these behaviors.

Health care providers may believe that educational interventions have the potential to modify individual behaviors through the use of such concepts as "efficacy expectations" (Bandura, 1977a, p. 193) and "internal versus external control of reinforcement" (Rotter, 1966, p. 1). The latter concept has also been referred to as "locus of control." An efficacy expectation, or self-efficacy, can be defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1977a, p. 193). An internal locus of control is the belief that one's own behavior can have an effect upon outcomes.

Health care researchers have suggested that higher levels of self-efficacy may occur through the use of patient education (Allegrante, MacKenzie, Robbins & Cornell, 1991; Corbett, 2003) and that this attribute has the potential to result in improved health outcomes (Allegrante et al., 1991). Authors of a 1999 study that found improved clinical outcomes through the use of a multidisciplinary arthritis training program concluded "the patients' impression of increased influence over the various aspects of rheumatoid arthritis may be a result of…more knowledge about the disease…" (among other factors) (Scholten et al., p. 1285). A 2002 study using a constructivist approach assessed efficacy beliefs, motivation and behavior in geriatric inpatients on the rehabilitation unit of a small orthopaedic hospital (Resnick, 2002). Responses to interviews revealed that belief in self-efficacy influenced motivation and behavior. Physical therapy patient compliance with exercise regimens was found to be diminished in a correlational study when patients

believed that exercising will not help much (Sluijs, Kok & van der Zee, 1993). In a randomized pilot study, an educational intervention improved diabetic patients' foot care knowledge and self-efficacy in addition to reported self-care practices (Corbett, 2003). Health care providers who desire to achieve beneficial health outcomes may consider educational interventions important to help patients achieve self-efficacy and an internal locus of control.

In addition to an historical and theoretical basis for the use of patient education, there are numerous research studies that support the use of patient education in health care. These findings have been reported for a variety of health conditions (Bourbeau et al., 2003; Burton, Waddell, Tillotson & Summerton, 1999; Clark et al., 1992; Montgomery, Lieberman, Singh & Fries, 1994; Scholten et al. 1999). The types of educational interventions used in these studies varies a great deal, including the use of educational booklets (Burton et al., 1999), self-management group intervention (Von Korff et al., 1998), individualized health recommendations sent to patients by mail (Montgomery et al., 1994), weekly visits by trained health professionals (Bourbeau et al., 2003) and formal group educational programs (Clark et al., 1992). The successful use of a variety of educational approaches endorsed the broad definition of patient education that was used for this study.

An editorial in the *British Journal of Rheumatology* by Kate Lorig from the Stanford University School of Medicine suggested that patient education had not been given the emphasis it deserved (Lorig, 1995). One problem cited by health care providers was a lack of funding for the provision of patient education (Cluff, 1981; Lorig, 1995; U.S. Department of Health and Human Services, 2000). Instead, there was the

expectation that patient education would be included as needed along with the other components of health care. When this happens, the end result might be the lack of an identified niche for patient education activities, creating a de-emphasis in favor of other interventions (Cluff, 1981). Another problem might be that health professional education programs traditionally offered little instruction to students on how to develop or apply patient education programs (Lorig, 1995). The United States Department of Health and Human Services recognized that this lack of training might also extend to clinical preventive care, such as counseling about behavioral risk factors for disease (U.S. Department of Health and Human Services, 2000). Since instruction on how to offer patient education activities might not be a formal part of the curriculum, health care professionals could be unsure of its natural place among health care interventions.

This situation is beginning to change. In health care today, there is a renewed interest in patient education. This trend might have been influenced by several occurrences. One factor could have resulted from the use of measures of quality of life for assessment of health care outcomes (Epstein, 1990). Traditionally, somatic measures were used to determine health status, but opinion changed to the point of view that health care outcomes should also be assessed in terms of patient function in everyday life (Cluff, 1981; Epstein, 1990; McDermott, 1981) In support of this trend, the United States Healthy People 2010 Initiative included quality of life as a measure of health status (U.S. Department of Health and Human Services, 2000). Since improvement in patient function was recognized as a desired outcome of health care, especially for chronic diseases (Cluff, 1981; Von Korff, Gruman, Schaefer, Curry & Wagner, 1997), health care providers called for changes in health care so that patients "...are more likely to receive

services that help them live as well as they can for as long as they can" (Von Korff et al., 1997, p. 1097) Patient education figured prominently among these services, which included planned documented formal education programs (Lorig, 1995), collaborative management (Von Korff et al., 1997) and greater emphasis on patient self-care (Cluff, 1981). This interest in the functional outcomes of health care was not limited to chronic diseases, but also included acute conditions, as recognized in a landmark paper by Waddell (1987).

Another reason for the renewed interest in patient education may have been one of necessity; a 1993 magazine article from the American Physical Therapy Association reported that fewer patient care visits might be possible in the environment of managed health care, leading to demands for better treatment effectiveness and outcomes (Monahan, 1993). In 1989, the United States Department of Health and Human Services found that eighteen percent of the population was covered by some form of managed care; by 1999, that percentage had increased to seventy percent (U.S. Department of Health and Human Services, 2000). Health care professionals have suggested increased use of patient education for self-care to help offset a diminished number of patient care visits and to counter rising costs (Monahan, 1993).

As a result of these occurrences, health care providers began to recognize that the use of patient education programs could be as important as other health care interventions in achieving the desired outcome. Kate Lorig, an advocate of self-help courses for patients with rheumatoid arthritis, wrote the following in an editorial: "It is our responsibility to our profession and patients to take a new look at patient education, to establish it as a necessary treatment and to give it a stable home" (1995, p. 704). The

United States' nationwide health promotion and disease prevention agenda supported this idea by proposing a goal to, "Increase the quality, availability, and effectiveness of educational and community-based programs designed to prevent disease and improve health and quality of life" (U.S. Department of Health and Human Services, 2000, p. 7-3).

Patient education within the physical therapy field has been influenced by these trends. The use of quality of life indicators for measurement of health outcomes in physical therapy was discussed by Jette (1993). The importance of patient education has become more widely acknowledged. In fact, although the accrediting body for physical therapy educational programs historically required the development of educational skills for program graduates (Chase, Elkins, Readinger & Shepard, 1993; Commission on Accreditation in Physical Therapy Education, 1990), newer guidelines are more specific for this instruction in terms of content, achievement of goals and outcomes (Commission on Accreditation in Physical Therapy Education, 1996; Commission on Accreditation in Physical Therapy Education, 2004). Development of educational skills is especially important in light of Sotosky's finding of physical therapists' perception of being inadequately prepared in teaching skills (1984). May found that physical therapists desired courses in educational theories and methodologies as part of entry-level education (1983). Findings from a 1993 survey of physical therapists in the United States reinforced this concept; academic education within the physical therapy program was identified as less important than other factors for the development of teaching skills (Chase et al.). Some of the other factors identified in this study included interaction with patients and colleagues, continuing education courses and clinical instruction within the physical therapy program.

Physical therapists have reported they believe patient education is valuable as a component of physical therapy practice (Chase et al., 1993; May, 1983; Sotosky, 1984). Of the physical therapists surveyed by Chase et. al. (1993), 87% reported they included patient instruction for 80%-100% of their patients. The *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001), a publication of the profession's national organization, offered a description of preferred practice patterns within the profession. The elements within the *Guide* were developed by expert consensus. Interventions were described for each of four main categories of health conditions: musculoskeletal, neuromuscular, cardiovascular/pulmonary and integumentary. Patient educational activities or training were described for these categories for various interventions, including patient/client related instruction, therapeutic exercise and functional training. As a result, patient education may cover a wide variety of content, including information about the health condition, specific management instructions, therapeutic exercises and functional training.

Although the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001) described educational activities, this information was not specific in terms of instructional content or design for distinct health conditions. For this information, physical therapists may be required to look elsewhere in developing educational plans. This, in fact, was found to be true in the previously described survey of physical therapists by May (1983). In this study, physical therapists indicated they had developed their skills in teaching in a variety of ways, including their training program in basic physical therapy education, trial and error method, continuing education courses and graduate education programs.

Additionally, since physical therapists provide individualized patient care plans according to patient diagnosis, disease status and other factors, the actual content of physical therapy patient education may vary in many ways. A review of the physical therapy literature reveals that many studies dealing with patient education have been general in nature and did not deal with specific health conditions (Chase et al., 1993; Gahimer & Domholdt, 1996; May, 1983; Sluijs, 1991b; Sotosky, 1984).

As a result, few resources exist for defining the content and delivery methods for patient education for specific health conditions, such as low back pain. Low back pain accounts for one of the most commonly seen conditions in orthopaedic physical therapy clinics (DeRosa & Porterfield, 1992; Jette, Smith, Haley & Davis, 1994), yet articles that focus on patient education for this condition are few. Of the articles that discuss patient education for low back pain, some do not describe the teaching method employed (Kerssens, Sluijs, Verhaak, Knibbe & Hermans, 1999a), others do not have patient education as their main focus (Battie, Cherkin, Dunn, Ciol & Wheeler, 1994; Byrne, Doody & Hurley, in press; Foster, Thompson, Baxter & Allen, 1999; Gill, Sanford, Binkley, Stratford & Finch, 1994; Jackson, 2001; Li & Bombardier, 2001; van der Valk, Dekker & van Baar, 1995), and still others are limited to the study of one or two educational methods (Burton et al., 1999; Cherkin, Deyo, Street, Hunt & Barlow, 1996; Friedrich, Cermak & Maderbacher, 1996; Hagins, Adler, Cash, Daugherty & Mitrani, 1999; Hazard, Reid, Haugh & McFarlane, 2000; Little et al., 2001; Roberts et al., 2002; Roland & Dixon, 1989). Physical therapists perceive patient education to be one of the preferred interventions for the treatment of low back pain (Li & Bombardier, 2001), yet there are differences among therapists in the amount of information that is provided to

patients (Kerssens et al., 1999a). In view of these findings, further study in this area would be beneficial.

The lack of definition and the potential variety of content and delivery methods in physical therapy education plans may lead to an ambiguity in physical therapy practice. This ambiguity has the potential to affect consumers and providers alike. What are the recommendations and instructions physical therapists can offer to their patients with low back pain? What is the evidence for the use of these instructions? How is this advice adapted to the needs of individual patients or for the management of specific health conditions? Answers to these questions can help to better define this aspect of physical therapy patient care. Physical therapists can use this information to clarify and improve the content and design of patient education programs.

Summary of Background Information

The use of patient education in health care is well documented historically and has a theoretical and empirical foundation. Recent trends in health care have resulted in an increased emphasis on the use of patient education as an intervention. Similar trends have been noted in the physical therapy profession. The physical therapy literature supports the use of patient education, and there is a renewed emphasis on this area of practice as a competency for graduating physical therapists.

Although patient education is acknowledged as a necessary component of care, there is a lack of an identified niche for these interventions. The actual content of physical therapy patient education plans may vary in ways that are not clearly defined for management of specific conditions such as low back pain.

Problem Statement

The content and design of physical therapy education programs for the management of low back pain are not well defined. This lack has the potential to diminish the effectiveness of the education programs.

Statement of Purpose

The purpose of this research study is to identify content and design of physical therapy patient education programs recommended in the literature and to assess the consistency between those recommendations, the recommendations of physical therapy educators and the practices of physical therapist clinicians.

Research Design

The research design for this study consisted of the development of research questions with related data collection and analysis. The questions are listed below, along with the sources of data for each question.

Research Questions

1. What are the components (content, delivery methods) of a physical therapy patient education program for a low back derangement syndrome that are suggested by the literature in this field?
    a. Data sources: literature (research, educational materials)
2. To what extent is there consistency among the patient education program suggested in the literature, the patient education program suggested by educators and the practices of physical therapist clinicians?
    a. Data sources: literature, physical therapist survey, physical therapist educator interview.

Operational Definition of Low Back Pain

An operational description of low back pain was needed because there is a diversity of opinion among health care professionals as to the origin or pathology of low back pain (DeRosa & Porterfield, 1992). Also, low back pain can represent a continuum from the acute to the chronic situation. Classification systems have been used for categorizing low back conditions.

The investigator of a critical analysis (Riddle, 1998) of selected classification systems for low back pain explained how some classification systems were designed to determine the most appropriate treatment, some to help in arriving at a prognosis, and others to identify pathology. Still other classification systems have been used for conducting systematic reviews of the literature, or for developing clinical practice guidelines. These systems have generally categorized low back pain as being specific or nonspecific in etiology.

The low back condition under investigation in the current study represents a category (or subgroup) from one of the available classification systems. Although this was the classification system and category eventually decided upon, at the outset of the study, the rationale for using this particular system and subgroup categorization was unclear. Thus, a literature review was conducted to help determine the operational definition of low back pain to be used for the current study.

Several classification systems were reviewed, including the four systems analyzed in the previously mentioned study by Riddle (1998), the system described by DeRosa and Porterfield (1992) and the classification methods used by large systematic review studies and practice guidelines (Bigos et al., 1994; Philadelphia Panel, 2001; Spitzer, 1987). The

simplest classification systems defined low back pain in terms of symptom location and excluded conditions in which specific pathology was present. The Agency for Health Care Policy and Research published a 1994 "Clinical Practice Guideline for Acute Low Back Problems in Adults" (Bigos et al., 1994). In this guideline, three descriptive clinical categories of low back pain were developed. One of these was defined as "Nonspecific back symptoms."

Nonspecific back symptoms were defined as symptoms occurring in the back not believed to be associated with nerve root compromise or a serious underlying condition (Bigos et al., 1994). Since the literature pointed to the concept that the exact pathological cause of low back pain was often undeterminable (DeRosa & Porterfield, 1992; Riddle, 1998; Spitzer, 1987), a nonspecific definition of low back pain was decided upon for the current study.

The following operational definition was developed for the current study:

> Low back pain: pain in the lumbar region with or without radiation to one extremity, in the absence of neurological signs and without suggestion of serious pathology.

This definition provided a standardized definition of low back pain that formed the basic topic for the patient education program under investigation in this study. As feedback from physical therapy clinicians and educators was obtained, the concept of how this definition fit into the research design was further developed. The next section explains this process.

Further Development of the Operational Definition

In order to make the study as far-reaching as possible, sub-categories for the operational definition were developed. The sub-categories were differentiated by the

presence of, or lack of, radiating pain in an extremity. The sub-categories were used because the literature suggested that physical therapists' treatment plans could differ according to the presence or lack of radiating symptoms in the leg (Battie et al., 1994; Poitras, Blais, Swaine & Rossignol, 2005).

The concept of the study was discussed with physical therapist clinicians in order to obtain their feedback. Physical therapists felt that the operational definition and its categories were too generalized. They suggested the definition/categories could be improved upon by including additional descriptive information. The study investigator subsequently included patient history and examination findings. This information could then be used to help determine the patient education program.

Since the literature showed that patient history/examination findings have been used to classify subgroups among the low back pain population (Delitto, Erhard & Bowling, 1995; McKenzie, 1981), the classification systems that used this approach were reviewed. Selected subgroup classifications were adapted for use. In order that patient history/examination findings could be supplied for each subgroup classification, clinical scenarios were developed. The clinical scenarios were not intended to be representative of an entire subgroup, but to offer a working model of the subgroup.

A rough draft of the survey instrument was formulated at the same time the clinical scenarios were being developed. Two facts soon became apparent: 1) in addition to the patient history/examination findings, further development of patient conditions[2] would be beneficial in order to capitalize on how they related to the patient education

[2] **Patient conditions**: A unique set of patient history, examination findings and circumstances that accompany an individual clinical scenario or patient example. The patient conditions were designed to be individualized, yet consistent with the operational definition/subgroup classification of low back pain used in the current study.

literature and 2) the survey would be too lengthy if more than one clinical scenario was used. This led to the decision to use a single clinical scenario and to expand upon the patient conditions. Given these changes, the term "patient example" was now used instead of "clinical scenario."

The next section describes the development of the patient example. At the conclusion of the section, an operational definition of the patient example is provided.

Development of the Patient Example

The author's clinical experience, information from continuing education courses (particularly, "The Lumbar Spine Mechanical Diagnosis and Therapy," by R. McKenzie), elements from classification systems (Delitto et al., 1995; McKenzie, 1981; McKenzie & May, 2003), the patient education literature and feedback from educators and clinicians all contributed to developing the patient conditions for the patient example.

The type of patient example decided upon was associated with a specific subgroup classification known as the derangement syndrome[3] (McKenzie & May, 2003). This decision was reached because the patient history/examination findings and the management for this syndrome have been well described in the literature. However, as noted previously, the patient example was not intended to be representative of the entire subgroup. Instead, the patient example had a unique set of patient conditions and circumstances. The patient conditions were designed to meet the following purposes: 1) be consistent with the operational definition of low back pain used in the current study, 2)

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[3] **Derangement syndrome:** The conceptual model for the derangement syndrome "involves internal articular displacement that causes a disturbance in the joint, which produces pain and impairment." (McKenzie & May, 2003, p. 710). The conceptual model relates presentation of the derangement syndrome to internal intervertebral disc displacements (McKenzie, 1981; McKenzie & May, 2003).

be consistent with the descriptions in the literature for a derangement syndrome and 3) give research participants a unique set of patient conditions and circumstances to respond to in developing the patient education program.

Operational Definition of the Patient Example

The following definition defines the term "patient example" as it is used throughout this study.

> Patient example: a description of a patient with a low back pain condition that is defined by pain in the lumbar region with radiation to the proximal extremity, in the absence of neurological signs and without suggestion of serious pathology. The example is classified as a derangement syndrome and supplies history and examination findings believed to be consistent with this syndrome. The example is not intended to be representative of all patients classified with a derangement syndrome; instead the patient example possesses a unique set of patient conditions and other criteria believed to be pertinent for management.

Methodology

The following section describes the methodology for this study.

Type of Study

The motivation for this study was a desire to know more about patient education in physical therapy. Patient education appeared to be an important part of clinical practice, yet there were few guidelines or resources available regarding the subject. When designing a patient education program, what types of information should be included? How should the information be conveyed?

A descriptive study was designed to gather information on these questions. Information sources included the literature, physical therapists, physical therapist educators, physical therapy program administrators and educational materials. Information from physical therapists was obtained using a survey. Information from

physical therapist educators was obtained using an interview. Physical therapy program administrators were contacted to identify the names of faculty and to provide brief information on the physical therapy program.

Selection of Study Population

The study population consisted of two groups: 1) physical therapists who were members of the American Physical Therapy Association and 2) physical therapy educators in physical therapy professional education programs, which included both physical therapy program administrators and physical therapy faculty.

The first group (physical therapists) was selected because physical therapists could offer information about the patient education practices they employ with their patients. Physical therapists were required to be members of the American Physical Therapy Association in order to obtain a national sample of physical therapists.

The second group was selected because physical therapy educators could offer information about how physical therapy students are trained for administering patient education programs.

Instrumentation

The design of this study required the development of instruments/forms for data collection. They were as follows: the physical therapist survey instrument (questionnaire and patient example), the physical therapist educator interview guide, the data collection form for physical therapy program administrators and the checklist for educational materials.

Survey. The literature was consulted in developing the physical therapist survey instrument (questionnaire and patient example). Since previous studies did not focus on

low back pain (Chase et al., 1993; Gahimer & Domholdt, 1996; Sluijs, 1991a; Sluijs, 1991b), or used categories of instruction that were felt to be too broad for the current study (Kerssens et al., 1999a), a new questionnaire was developed for the current study. The questionnaire was designed in conjunction with a description of a patient example. The patient example was based on the literature as discussed in the section on operational definition of low back pain.

The questionnaire and patient example were submitted to outside reviewers consisting of physical therapy educators and the author's doctoral committee. Changes were made to the questionnaire to address comments and suggestions by the outside reviewers. Following a pilot test of the survey, final revisions took place. This completed the development of the questionnaire and patient example for the physical therapist survey (see Appendix A).

Data collection form for program administrators. Physical therapy program administrators were contacted for two purposes: 1) to gain brief information about the physical therapy program and 2) to obtain the names of educators who instructed physical therapy students in patient education.

The data collection form for physical therapy program administrators was designed to answer a few questions about the program. This information was sought so that instruction of physical therapy students in patient education could be seen within the context of the individual program and curriculum (see Appendix B).

Interview. Information from physical therapy educators was gathered through an interview process. It was felt that a survey to this participant group would result in a minimal response rate. An interview also had some advantages over a survey in that

probing questions could be used to help explore the reasons for responses. The interview guide was developed so that it was aligned with the research questions and the physical therapist questionnaire (see Appendix C).

Checklist. A checklist was used to record the data gathered from textbooks and continuing education courses identified in the survey or interview. The checklist was developed from the research questions and the literature review, using the previously identified patient education topics. This process allowed the checklist to be consistent with the items on the physical therapist questionnaire. An open-ended section was available on the checklist to include information that was not already identified from the literature search (see Appendix D).

Literature Search

A literature search was conducted for patient education in the management of low back pain. Initial analysis was done to see if low back pain instructions and delivery methods could be organized into distinct topics. This initial search primarily focused on the physical therapy literature. The information that was gathered was used to develop the educational program topics on the survey instrument, as well as guide the interview questions and how information was recorded from the comprehensive review of the literature.

The next step was the comprehensive literature review. Using the previously identified topics for patient education, information was sought regarding the content and delivery methods of patient education. Data sources included scientific review studies, randomized controlled trials, clinical trials, case reports and expert opinion. Databases included Medical Literature Analysis and Retrieval System Online (MEDLINE),

Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science (WOS) and Education Resources Information Center (ERIC). If new topic areas were discovered, these were identified and added to the results of the comprehensive literature review. In areas where the literature search yielded little information, the search was broadened to include sources other than the physical therapy literature, or health care topics other than the management of low back pain.

Administration of Survey

The first group of physical therapist questionnaires was mailed to 300 physical therapists employed in an outpatient orthopaedic setting. The random sample was drawn from a national population of members of the American Physical Therapy Association. The next set of questionnaires was mailed to 300 physical therapists who were Board Certified Specialists in Orthopaedic Physical Therapy, drawn from a national population of members of the American Physical Therapy Association.

Administration of Data Collection Form for Program Administrators

The participants for this part of the study were program administrators from 20 entry-level physical therapy educational programs. Programs were selected based on the following four factors: geographical region, public versus private, program level and program distinction. The investigator initiated contact with 42 programs via the program administrators. Of these, four program administrators declined to participate, 16 program administrators did not respond or failed to complete the data collection form, and, for two programs, the faculty did not respond or failed to participate in an interview. The remaining 20 programs had full participation by the program administrators and at least one faculty member.

An introductory letter and the data collection form were provided to all program administrators. In addition to answering the questions on the data collection form, program administrators were also asked to provide the names of physical therapy educators (faculty) whose instruction included patient education. Data collection from the program administrators took place between January and April, 2006.

Administration of Interview

Faculty members were contacted by e-mail or phone to request their participation in the study. At least three attempts were made to contact all faculty members identified by the program administrators, but not all faculty members responded to these contacts. A total of 52 faculty members were contacted. Of these, 32 faculty members elected to participate in the interviews. The data from one of these interviews was later excluded because the faculty member's teaching was at the post-graduate level. Thus, data were available from 31 physical therapy educator interviews.

Faculty members were sent an introductory letter and a copy of the patient example. If faculty agreed to participate, an interview time was set, and the study investigator conducted a telephone interview on the designated date. Data collection from the physical therapy educators took place between January and April, 2006.

Administration of Checklist

The responses from the survey and interview were analyzed to determine the textbooks and continuing education courses physical therapists and educators identified as contributing to the development of patient education programs. The three most frequently identified choices for each category were selected for review. Available materials were obtained and reviewed by the study author. A checklist was completed

for each data source. This comprised the data collection process for educational materials.

Data Analysis

Data were available from several different sources: literature findings, physical therapist survey, physical therapist educator interview, program administrator data collection form and the checklist for educational materials. A description of how the data were compiled and used is provided below.

Data from the literature search were used to answer the first research question: "What are the components (content, delivery methods) of a physical therapy patient education program for a low back derangement syndrome that are suggested by the literature in this field?" Descriptive studies of physical therapy practice were reviewed. Next, information was sought for the patient education topics that had been identified for the physical therapist survey instrument. The available information was compiled and categorized using these topic headings when possible. For each topic, a description of the education and delivery method was provided, along with the available research to support its use. In determining the research support for the use of a particular topic or delivery method, greater weight was given to results from scientific review studies, clinical trials and professional practice standards. These types of studies use objective analysis to acquire knowledge and test elements of clinical practice. To help determine the relative effectiveness of various delivery methods, an additional search was conducted on this topic alone. Finally, the literature on education and learning theories was consulted to gather information on the features of an optimal patient education program.

Data from all the data sources (physical therapist survey, physical therapy educator interview, literature review and educational materials) were used to answer the second research question: "To what extent is there consistency between the patient education program suggested in the literature and the patient education program suggested by educators and practitioners in the field?" Since data for this study were categorized using similar topic headings, comparisons among sources were facilitated. Any discrepancies among the data from the literature findings and practice as it is currently conducted in the field were identified. Potential reasons for discrepancies in the data were explored.

Limitations of this Study

This study had several potential limitations. They are as follows:

1. The patient example had specific history and examination findings. Consequently, the results of this study cannot be generalized to patients with other characteristics. A related limitation was that the patient example excluded certain factors. For example, some patients could have special learning needs or individual circumstances that could alter the patient education program. The exclusion of these factors was a limitation of this study.
2. The example did not have a pathology-based diagnosis. Instead, the example was classified as having a derangement syndrome. For reasons discussed previously, the use of a classification scheme (instead of a pathology-based diagnosis) was felt to be appropriate. Nevertheless, the lack of a specific pathology-based diagnosis might have introduced an element of ambiguity. This potential level of uncertainty was felt to be acceptable because the example was designed to be consistent with clinical

practice, in which a degree of uncertainty regarding patient diagnosis is often present (Spitzer, 1987).

3. The survey population was limited to physical therapists who were members of the American Physical Therapy Association (APTA). In addition, therapists were registered with the APTA as Certified Specialists in Orthopaedic Physical Therapy, or as practicing in an outpatient clinic. It is not known how these therapists' responses could have differed from other populations.
4. An emerging limitation of this study was the possibility of a non-response bias. Since the names and addresses of survey participants were not maintained after the survey mailings, non-responders could not be contacted to determine the reasons for their lack of response. It is possible that their reasons for not responding could have affected the survey results. The same is true for the physical therapy educators who did not respond to the interview contacts.

Assumptions

This study asks the reader to make several assumptions. They are as follows:

1. The use of sub-group classifications for low back pain is appropriate for use in clinical care. The use of sub-group classifications for making treatment decisions has been supported by the literature (Delitto et al., 1993; Fritz, Delitto & Erhard, 2003) and by physical therapists who were consulted on this aspect of study design. Their comments resulted in changes in the way low back pain was defined.
2. The patient example used in this study is characteristic of a specific sub-group classification. The literature was consulted for development of the patient example, and the example was brought under the scrutiny of physical therapist educators.

Their suggestions were implemented in the final version of the example. Physical therapists who participated in subsequent pilot testing of the survey instrument (questionnaire and patient example) did not raise any questions or concerns regarding the patient example.

3. The selected samples of respondents were representative of their respective populations.
4. The physical therapy patient education appropriate for the patient example (those suffering from derangement syndrome) is distinct from that of other patients or other low back conditions. This assumption is implied by the design of this study. The extent to which this assumption is true cannot be determined from this study. This study was limited to a description of the patient education specific to the patient example.
5. Participants' responses on the survey and interview are indicative of their perception of appropriate patient education for the patient example. This assumption cannot be tested, and responses must be taken at face value.

Importance of this Study

The results from this study will benefit the physical therapy profession by helping to better define this aspect of care; therefore, physical therapists and other health professionals can more readily identify the services that physical therapists can offer to individuals with low back pain. This knowledge will assist physical therapists in developing and designing educational plans and incorporating these interventions into the overall plan of care. This information is needed since researchers have stated, "the dearth

of reliable data on the practice of physical therapists has limited the profession's ability to contribute to policy debates..." (Li & Bombardier, 2001, p. 1019).

The information from this study should also help individuals with the low back condition under investigation to receive consistent and current information for the self-care of their condition. Researchers from a 1999 study stated that the variation that existed among therapists for patient education for low back pain was greater than that among patients, causing them to remark that this was "an indication of sub-optimal education" (Kerssens et al., 1999b, p. 174). Arriving at a more consistent body of knowledge for what constitutes the patient education program will offer all patients similar opportunities to receive this care.

Physical therapy educators will also benefit from the information obtained through this research. The literature review will help to determine the best available knowledge on this topic. The specifics of how other educators teach this content will help in gaining new perspectives on what should be taught. Information on current practice will help educators determine what is currently available and the factors that may affect the application of the patient education program.

Definition of Terms

Patient Education

One of the main terms used in this study is "patient education." Conceptually, patient education was defined as follows:

Concept of Patient Education

Patient education refers to the communication between health care provider and patient for the following purposes: 1) discussion about the health condition, 2)

discussion/training regarding management of the health condition and 3) collaboration in the setting of individualized care plans and treatment goals. This communication may occur on an informal basis or as part of a formal, structured educational program. This communication may occur through the use of a variety of delivery methods, including verbal, individualized handout, pre-published material, computer or video program or individual training (these terms are defined below). For the purposes of this investigation, the terms "patient education," "patient instructions," "patient/client-related instruction," "training," "advice" and "counseling" are considered synonymous.

Content of Patient Education

The *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001), a publication of the American Physical Therapy Association, offers a description of the content for patient/client-related instruction. This description was used for the survey and interview and is as follows: the "instruction, education, and training of patients/clients and caregivers regarding current condition, enhancement of performance, health, wellness, and fitness programs, plan of care, risk factors for pathology/pathophysiology, transitions across settings, transitions to new roles" (American Physical Therapy Association, 2001, p.103). In the *Guide*, patient/client-related instruction is included as a component of physical therapist intervention.

Patient Education Delivery Methods (Teaching Methods/Resources)

Verbal Instruction

The physical therapist verbally instructs the patient/client in the content, technique or procedure. Instructions may be augmented by the use of charts, graphs, pictures or anatomical examples.

Individualized Handout

The physical therapist provides the patient/client with a written handout to take home. The handout is *individualized* and may include text, sketches or photographs. The physical therapist customizes the handout specifically for the individual patient/client using a computer program or educational materials.

Pre-Published Material

The physical therapist provides the patient/client with pre-published material to take home or access on the computer. The handout is *not individualized* for the patient/client, but is an "off the shelf" instructional sheet, pamphlet, booklet or internet resource. Pre-published material may be produced by the physical therapist or an outside resource.

Computer or Video Program

The physical therapist requests the patient/client to view a computer or video program in the clinic or at home. The computer or video program is *not individualized* for the patient/client.

Individual Training

The physical therapist instructs or demonstrates the desired learning behavior for the patient/client in an *individual training session.* The patient practices performing the behavior under the supervision of the physical therapist.

Organization of the Study

This study is organized into five chapters. Chapter 1 contains an introduction to the research study, including its purpose, design, importance and assumptions/limitations. Chapter 2 provides a review of the relevant literature. Chapter 3 describes the study methodology, including the development of definitions, the instrumentation and the

administration of the research. Chapter 4 consists of the study results from the physical therapist survey, the program administrator data collection forms, the educator interviews and the checklist for educational materials. Chapter 5 provides a summary and discussion of the study findings, together with conclusions, implications and recommendations.

CHAPTER 2: LITERATURE REVIEW

The physical therapy literature on patient education contributed to the current study in several ways. Some studies reviewed patient education for general physical therapy care. Others specifically investigated patient education for low back pain. Study purposes were varied. Some addressed the content of patient education, and some addressed other aspects of patient education, such as delivery methods or factors related to effectiveness. Still other studies compared delivery methods—these studies usually did not deal with low back pain, but focused instead on other health conditions.

Apart from the physical therapy literature, physicians and other groups have also researched patient education. These groups have examined the topic from various perspectives.

For the purposes of the current study, the physical therapy literature was reviewed in detail, while the literature from other health professions was reviewed more superficially. The more superficial analysis of literature in health professions was appropriate because the practice focus of these groups differs from that of physical therapists and because their educational content/methods were not always applicable.

In the context of interventions for low back pain, the majority of studies reviewed were those that apply directly to the patient example (operational definition) used in the current study. This approach included studies investigating disc lesions and selected studies evaluating acute or sub-acute low back pain. For studies on acute or sub-acute low back pain, the characteristics of the patient population were reviewed to ensure similarity with the patient example. Studies that dealt with chronic low back pain or other specific pathology-based diagnoses were excluded. For cases in which the low

back pain was not well defined, the study might still have been included in the review. However, a statement explaining the reason for the inclusion was provided.

Importance of Patient Education in Physical Therapy Practice

The following section focuses on the importance of patient education in physical therapy practice. Several surveys of physical therapists have been conducted. These studies were reviewed, as well as a study that examined the relationship between physical therapy treatment goals and interventions.

In 1981, a survey was conducted of physical therapists and physical therapy educational program administrators to determine perceptions toward, participation in and preparation for teaching as an area of physical therapy practice (May, 1983). Questionnaires were sent to a random sample of active American Physical Therapy Association members and administrators of all entry-level physical therapy education programs. The majority (greater than 75%) of physical therapists agreed that teaching is an important skill in physical therapy practice and that physical therapists should have knowledge of educational theory and methodology. For physical therapists who spent at least 20 hours a week providing direct patient services, 98% indicated they taught individual patients. Of all the program administrator responses, 65% indicated that the curriculum of physical therapy entry-level programs included educational theories and methodology. However, from a list of possible options on which therapists could check more than one option, only 34% of physical therapists indicated that they had developed their skill in teaching as part of their basic physical therapy education, and 66% reported that they used trial and error to develop these skills. For the skills identified as being

important to the practice of physical therapy, there was limited agreement between educational program content and practitioners' perceptions.

Another survey of physical therapists was published in 1984 (Sotosky). This survey was limited to a random sample of Pennsylvania Physical Therapy Association members. Results indicated, "...teaching is a positively valued role of practicing physical therapists" (p. 349). In concurrence with the previous study, the results from this study supported the earlier finding that many practicing physical therapists do not feel fully prepared in teaching skills through their basic training.

A more recent study in 1993 also addressed the perceptions of physical therapists regarding patient education (Chase et al.). Surveys were sent to a random sample of American Physical Therapy Association members. Three hundred surveys were distributed nationwide with a 72% response rate. Of the 215 returned surveys, 200 were eligible for analysis. Results showed that a large majority of physical therapists were involved in teaching 80% to 100% of their patients. In determining the relative value of patient education in clinical practice, over 90% of the respondents rated the following factors as the most important or very important aspects of care: providing the instruction needed to perform functional activities and providing hands-on treatment.

In a 1993 study, Dekker, van Baar, Curfs & Kerssens investigated the relationship between treatment goals and interventions among physical therapy practices in the Dutch primary health care system. The relative contribution of instruction (home exercise) and advice (living rules) to treatment was 8.2% and 2%, respectively. The relative contribution of exercise therapy to treatment was 20%. The other interventions listed in this study (massage, manual therapy, ultrasound therapy and other physical agents) were

those for which patient education would be considered less likely to play a role, and so are not discussed in detail here. Averaged for all patients, the relative contribution of patient education to treatment was at least 10.2% and was probably due to the instructions that normally accompany exercise therapy.

Summary

Results from these studies indicated that the great majority of physical therapists identified patient education as part of the treatment of most of their patients and that this was perceived to be a very important aspect of care. Given the large role patient education plays in physical therapy practice, what do we know about the content of patient education programs and how these instructions are delivered? Answers to this question, as it relates to physical therapy practice and the care of a low back derangement syndrome, is provided in the following sections.

Patient Education: Physical Therapy Literature

This section reviews the physical therapy literature for patient education. The studies in this section discuss patient education as related to physical therapy practice. Five studies were found.

As discussed in the previous section, a study by Dekker et al. (1993) investigated the relationship between treatment goals and interventions among physical therapy practices in the Dutch primary health care system. When interventions were examined in relation to treatment goals, Dekker et al. found that the amount of patient education provided depended upon the treatment goal. Unfortunately, this study did not describe the content of patient education other than naming it "instruction," for home exercises, and "advice," for living rules (p. 573). Instruction in home exercises figured prominently

for goals regarding impairments such as improvement of muscle strength and improvement of posture. The relative contribution of instruction to the treatment for these goals was 32% and 38%, respectively. Advice (living rules) figured less prominently for treatment goals regarding impairments, with a highest relative contribution (9%) given to treatment for improvement of posture. For treatment goals regarding disabilities, the relative contribution of home exercise instruction was highest for treatment goals involving lifting (16%) or sports (16%). The relative contribution of advice (living rules) was highest for treatment goals involving getting in and out of bed (20%), shopping (17%), doing housework (20%) and hobbies (21%).

This study by Dekker et al. was considered important because it demonstrated a relationship between treatment goals and the application of two different content areas in patient education. This finding implied that patient education is individualized to the needs of the patient and supported the use of a specific patient example for the current study.

In a previously discussed study by Chase et al. (1993), researchers assessed the perceptions of physical therapists toward patient education, including the content areas of patient instruction. A survey was administered to a random sample of 300 American Physical Therapy Association members nationwide from a variety of practice settings. The study defined 23 content areas of patient instruction. The study findings are listed below for the 15 content areas most frequently taught. These topics were taught most of the time by over 50% of the respondents:

- Rationale for treatment
- Home programs
- Strengthening

- Range of motion, stretching
- Postural awareness
- Basic safety precautions
- Prevention, risk factors
- Body mechanics
- Functional mobility
- Signs and symptoms of complications
- Positioning
- Pain management
- Anatomy/biomechanics of complications
- Etiology of diagnosis
- Simulating home and/or occupational situations

Over 90% of the respondents indicated that patients were frequently taught about treatment rationales, home programs, strengthening and stretching.

In 1991, Emmy Sluijs (1991a) developed a checklist to assess patient education in physical therapy practice. The checklist was drawn from the literature and was categorized into five educational elements:

- Teaching and informing the patient about the illness
- Instructing the patient to perform home exercises
- Giving advice and information
- Giving general health education
- Counseling the patient about stress-related problems

From a sample of physical therapists who practiced in ambulatory care or private practice in the Netherlands, 227 treatment sessions were audiotaped. The items on the checklist were checked off as being present or not present based on what was heard on the tapes. If an item was present, the number of "informative statements" the therapist made about the item was also recorded. Low back pain was the most frequent complaint of the patient population seen by these therapists. The study demonstrated that the checklist could be used to assess physical therapists' educational activities. Results showed that physical therapists concentrate their educational efforts on the following: information about illness

(present in 85% of the audiotaped sessions), advice and information (present in 78% of the sessions) and instructions for home exercises (present in 59% of the sessions). Less effort was given to health education (36% of the sessions) and stress counseling (27% of the sessions).

Gahimer & Dumholdt (1996) conducted a study that sought to extend previous research (Sluijs, 1991a; Sluijs, 1991b) by assessing informal patient education conducted by physical therapists in the United States. The specific population who participated in this study consisted of 37 physical therapists from nine outpatient orthopaedic physical therapy settings in central Indiana. Of the patients who were seen by these therapists, the majority had extremity dysfunction, and a minority had spinal dysfunction. Audiotapes were analyzed for the same five categories of educational elements found in the previous studies (Sluijs, 1991a; Sluijs, 1991b). Results showed that the main categories of information provided were information about illness, home exercises and advice and information. The topics included under the heading of advice and information were: rest, correct posture and movement, work, sports, hobbies, daily activities, self-care, aids and appliances and health services. Little information was provided regarding stress counseling or health education. As descibed by Sluijs (1991b), the greatest amount of educational information was given in the first few treatment sessions, compared with subsequent sessions. Interestingly, these two studies, one performed in the Netherlands, and the other in the United States, showed similar findings, although differences had been noted in the past between the two countries in the area of patient education (Simonds & Kanters, 1990).

Simonds and Kanters (1990) conducted a study, entitiled, "Comparative Analysis of Patient Education by Four Professions in the Netherlands and the United States," to explore the way these selected professions used patient education. One of the professions reviewed was physical therapy. The findings for physical therapy in the United States were that "physical therapists are expected nowadays to recognize and apply concepts of health promotion, disease prevention, and health maintenance, as well as educate the patient and family regarding the physical therapy itself" (p.160). Additionally, "they are expected to....educate the patient regarding his/her lifestyle as it affects health" (p.160). No other data were available on the use of patient education by physical therapists in the Netherlands at the time the study was performed. More current information, in the form of the findings from the studies mentioned previously (Gahimer & Domholdt, 1996; Sluijs, 1991a; Sluijs, 1991b;), suggests that the content of patient education is similar for physical therapy practice in the Netherlands and the United States.

Summary

In summarizing the findings from these studies, the most common patient education included information on the illness, treatment rationales, home programs, strengthening and stretching. One broad and commonly used category identified in two of the studies was termed "advice and information." The topics included under this heading were: rest, correct posture and movement, work, sports, hobbies, daily activities, self-care, aids and appliances and health services. Less commonly used educational topics included information on general health education and counseling for stress-related problems. Finally, the content of patient education for physical therapy practice appeared

to be related to treatment goals, implying that patient education is customized for the needs of the patient.

Patient Education for Low Back Pain: Physical Therapy Literature

This section reviews the physical therapy literature specifically as it relates to the treatment of low back pain. Nine studies were reviewed; seven of these attempted to describe clinical practice through the use of a survey or other instrument. Of the remaining two studies, one consisted of a literature review, and the other was a retrospective review of clinical records.

A survey study by Li and Bombardier (2001) was carried out in Canada to help determine if the low back pain management guidelines released in 1994 had influenced management of low back pain. The specific guideline under investigation was the 1994 United States Agency for Health Care Policy and Research Clinical Practice Guideline No. 14: Acute Low Back Problems in Adults (Bigos et al., 1994). The study used three case vignettes exampled after a study used with Ontario physicians. The vignettes lacked impairment data (such as posture and limitations in range of motion or strength), but they did differentiate patients according to condition acuity and symptom location (localized low back pain versus low back pain with sciatica). Study results showed that the treatment preferences of physical therapists in Ontario included individual patient education on back care, exercise at home, exercise at clinic, work modification and back school (not a complete list; only those treatment preferences that relate to patient education are included here). The content of individual patient education on back care was not defined in the study.

The same study (Li & Bombardier, 2001) found that treatment preferences varied according to patient characteristics. For the vignettes involving acute (duration of symptoms less than five weeks) low back pain with or without sciatica, the interventions most preferred by physical therapists were as follows: individual patient education on back care, exercise at home and exercise at the clinic. For the vignette on sub-acute (duration of symptoms for five weeks or longer) low back pain, the interventions most preferred by therapists were as follows: exercise at home, exercise at the clinic and work modification. The differences in treatment preferences found in this 2001 study supported the use of a specific patient example in the current study.

Another study by Battie et al. (1994) also used clinical vignettes to assess attitudes and treatment preferences of physical therapists in managing low back pain. This study included 71 physical therapists employed by a large health maintenance organization in western Washington and a random sample of 331 other therapists licensed in the state of Washington. The therapists were asked to respond to a questionnaire that included items on provider characteristics, attitudes about low back pain, beliefs about the causes of back symptoms, evaluation and treatment preferences and confidence in treating patients with back pain. Three clinical vignettes were used and consisted of the following hypothetical patient examples: chronic low back pain, acute-recurrent low back pain and acute low back pain with sciatica. As in the study by Li and Bombardier (2001), the vignettes lacked impairment data. Study results demonstrated that treatment preferences varied according to the patient vignettes. For the patient examples with chronic low back pain and acute-recurrent low back pain, the most common treatment preferences were education on proper body mechanics, and stretching, strengthening and

aerobic exercises. For the patient example with acute low back pain and sciatica, "...more than half of the therapists recommended only ice and education...," and "at least 35% of therapists recommended bed rest (a mean of 1.8 days) and anti-inflammatory medications for the patient with acute low back pain and sciatica" (p. 222).

A recent study (Poitras et al., 2005) surveyed physical therapists working in private clinics in Quebec, Canada, about their management of work-related low back pain. Therapists were asked to complete a clinical management questionnaire to describe their management of the first two eligible workers who were missing work due to acute or sub-acute low back pain (one with and one without presence of radiating pain below the knee). Acute was defined as being in the first month of symptom duration. The patients and other characteristics of this study were not an exact match for the perceived current study. Some of the differences included the following: the study took place in Canada, the patients had sustained a work-related injury and the patients' low back pain characteristics were not an exact match for the patient example. Considered apart from these limitations, however, the patient population was similar to the patient example. One of the study objectives was to determine the effect of radiating pain below the knee on treatment goals and intervention choices. Since no further details were given, it was not possible to determine how certain patient characteristics (such as impairment data, symptom severity, *et cetera*) might have influenced the treatment choices in this study.

The Poitras et al. study (2005) found that the mean number of treatment sessions for the episode of care varied between the two study populations. The mean number of sessions for patients without radiating pain was 20.7, and for patients with radiating pain it was 27.4. The number of treatments provided per week was not reported. This

information is important in the context of this study because the current study asked physical therapists to describe the patient education for the patients in the example over the first two weeks of care. In addition, the patient example had treatment commencing at one week after onset of symptoms, while patients in the study by Poitras et al. received care for an average number of 21.3 days (patients without radiating pain) or 24.5 days (patients with radiating pain) before the first treatment. These differences made comparison between the current study and the study by Poitras et al. difficult. However, it was still felt that patients within the example used in this study fell within the broader population of back pain sufferers described by Poitras et al.

Poitras et al. found that the following topics of patient education were covered at least once during the episode of care (topics are listed in order of frequency for the percentage of physical therapists listing this topic for patients without radiating pain):

- Stretching exercise program
- Explanation of physical cause of back pain
- Strengthening exercise program
- Pain control
- Activities at home: increase
- Activities of daily living
- Ergonomics/work tasks
- Posture education
- Activities at work: increase
- Activities at home: decrease
- Cardiorespiratory exercise
- Lumbar roll use
- Activities at work: decrease
- Lumbar corset use

The percentage of physical therapists who provided education on these topics at least once during the episode of care for patients with radiating pain followed a similar pattern, but there were some differences. For instance, workers with radiating pain were more

likely to receive advice to decrease home activities than were workers without radiating pain.

The most frequent topics provided during the episode of care (for mean frequency of use during the episode of care among therapists who used the intervention at least once) were stretching and strengthening exercises. Workers without radiating pain were more likely to receive more frequent education on ergonomics/work tasks than workers with radiating pain.

The content of patient education was found to vary across the episode of care. As the episode of care progressed, the following topics showed a decrease in frequency for both groups: posture education, lumbar roll use, activities of daily living advice, pain control, explanation of the physical cause of low back pain and decrease in home activities. In contrast, the following topics showed an increase in frequency: strengthening exercise program, increase in home activities, cardiorespiratory exercise program and increase in work activities. For workers without radiating pain, there was less frequency for advice on decreasing work activities and increased frequency for advice on ergonomics/work tasks.

The Poitras et al. study described distinctions in the content and frequency of patient education. These variations were related to patient characteristics and the specific time period during the episode of care.

"Instructions and advice" did not account for a large percentage among the total number of interventions used for treatment of patients with low back pain in a study performed in the Netherlands (van der Valk et al., 1995). This study was based on an analysis of data from physical therapy registration forms. Eighty-three physical

therapists participated, working in 32 physical therapy practices in primary health care. All newly referred patients were registered using a form that collected information on general patient characteristics, diagnosis and treatment goals and interventions. The patients were categorized into three groups: 1) patients with back pain present for less than one week at the start of physical therapy, 2) patients with back pain present for longer than three months and 3) an intermediate group—patients with back pain for more than one week but shorter than three months. Study results showed that "instructions and advice" (educational content was not defined) accounted for 9% of the interventions used for patients with back pain of less than one week. For duration of pain from one week to three months, this percentage increased to 11.5%, and for duration of pain for longer than three months, this percentage was 10.6%.

Other findings from this study were that some types of patient impairments and disabilities were associated with symptom duration. Similar findings were present for physical therapy treatment goals and application of interventions. Since these findings shed light on physical therapy treatment goals and interventions used early in the episode of care, this information could apply to the current study.

The content and sequence of back care instructions were investigated in a 1999 study in the Netherlands (Kerssens et al., 1999a). The authors used a registration form that asked physical therapists to record the kinds of instructions given to their patients in each treatment session. The form was developed through a review of all published information for back care instructions and practice information. A list of items was developed and condensed into categories. Pilot testing was conducted with four

experienced physical therapists. The main categories of patient education derived from this instrument were as follows:

- Pain management
- Back care in activities of daily living
- Exercises
- General Fitness
- Other

Results of this study showed that "...a total of 6,078 instructions were given to 132 patients over 1,151 sessions" (p. 290). Of the 6,078 instructions, 885 related to pain management, 2,379 concerned taking care of the back while performing daily activities, 2,234 were on home exercise and 444 were about physical fitness. For several of the topics, common types of instructions were identified. For pain management, the most common instructions were about resting to avoid pain (23.3% of the sessions) and doing analgesic exercises (19.4% of the sessions). For taking care of the back while performing daily activities, the most common instructions were about sitting posture (29.2% of the sessions), standing posture (25.4% of the sessions), information on how to avoid overloading the back (20.1% of the sessions) and how to alternate body position during daily activities (24.6% of the sessions). For exercises, the most common exercises were for increasing mobility of the lumbar spine (48.6% of the sessions), strengthening the abdominal muscles (27.5% of the sessions) and strengthening the back muscles (22.0% of the sessions).

The study just described was similar to previous studies by Gahimer and Domholdt (1996) and Sluijs (1991a, 1991b) in that the frequency of instructions declined as the sessions progressed. However, one of the study findings was in contrast to previous studies. In other studies, (Battie et al., 1994; Dekker et al., 1993; Li &

Bombardier, 2001; Poitras et al., 2005; van der Valk et al., 1995) the researchers found that treatment preferences or treatment interventions (including education) would vary in association with patient characteristics or treatment goals. The Kerssens et al. study (1999a) found that differences among patients accounted for only 11% of the variance in the number of instructions given. In the investigators' words, this indicates that "...the information and instructions were not fully tailored to each patient's situation..." (p. 294). Discrepancies among research findings such as these underscore the need for further research in the area of patient education.

A descriptive questionnaire was used in a study (Foster et al., 1999) to assess physical therapists' management of nonspecific low back pain. This study was performed in Britain and Ireland over an 18-month period from 1994 to 1996. Questionnaires were distributed to 2,654 physical therapists; 1458 responses were received, and, of these, 813 responses were from therapists currently involved in the management of low back pain. Results of the survey indicated that 21% of physical therapists perceived patient education as a most important treatment goal for low back pain patients. The number of patients seen as related to the acuity of the low back condition varied according to therapists' employment setting. This information was described in terms of the modal groups for each setting. Chronic low back conditions characterized 52.6% of patients seen by therapists employed by the British National Health Service/Trust System or Irish Healthboard; subacute conditions characterized 40.3% of patients seen by physical therapists in private practice; and closely related were patients with acute conditions at 39.7% in private practice. From a list of possible low back pain classifications/diagnoses, disc prolapse was identified by 93.4% of therapists as

the most frequently managed, while postural problems were identified by 96%, sciatica by 96.4% and degenerative changes by 96.8%. In rating "methods of management used most often," 58.9% of therapists selected Maitland mobilization, and 46.6% of therapists selected the McKenzie approach. Other frequently used techniques included abdominal exercise, passive stretching and neural tension. Few therapists (21) reported they used back schools or classes as a common method of management. In the discussion section, the authors reported that therapists described the use of various types of exercises, including active home exercises and strengthening, abdominal, aerobic, relaxation and muscle imbalance exercise. There seemed to be no clear preference for one type of exercise over another.

A 2001 retrospective study (Jackson, 2001) in England assessed the management of low back pain in a newly established community-based physiotherapy department. The records for the first two hundred patients referred to the physical therapy department were reviewed. One hundred and eight patients completed a course of treatment. Almost two-thirds of these patients had a low-back-pain duration of six weeks or less. Only the interventions associated with patient education are presented here. Of the 108 patients who completed a course of treatment, 68% of patients received exercise, and 58% received the McKenzie method of treatment. No patients were offered "neural tension" or "ice." Eighty-four percent of patients received general advice (the term "general advice" was not defined in the study), while 52% were given postural advice. Fifty-one percent were given literature. The problems of 86% of this group (the patients who completed a course of treatment) were either substantially improved or resolved. The

investigator stated the data appeared to reflect the philosophy of the department in encouraging the patients in self-management.

A literature review (Klaber Moffett, 2002) by the Deputy Director of the Institute of Rehabilitation of the University of Hull was conducted in 2002 to determine how patient education for back pain could encourage a self-management approach. The article from the journal *Physiotherapy Theory and Practice* is summarized here. Use of an active management approach and an effective therapeutic alliance between patient and physiotherapist were suggested. Patient education should reassure the patient regarding the cause of back pain, and any mistaken beliefs should be dispelled. Home programs should have realistic goals that are developed between the patient and practitioner. They should be designed to gradually increase the amount of exercise or activity and use positive support systems. An educational booklet, *The Back Book* (Burton, et al., 1999), was suggested as reinforcement for self-management. Back schools were felt to be mainly successful in an occupational health setting; however, the traditional information on biomechanics is being challenged by recent research. Newer findings on intradiscal pressures appear to dispute earlier findings that these pressures are higher in sitting than erect standing. Also, pressures are higher when actively straightening the spine than with the relaxed upright sitting posture. This information calls into question the advice commonly given to patients to maintain the lordosis while sitting. Recent studies also suggest that avoiding sustained postures is important to increase the flow of nutrition to the disc. Finally, use of the "squat technique" for lifting may not be advantageous over the "stoop" lifting technique because the load is usually some distance from the body

with the squat technique. Instead, advice to keep the load close to the body appears more critical.

The use of exercise therapy for acute and chronic low back pain was investigated in a study in Ireland (Byrne et al., in press). This study used a questionnaire to assess physical therapists' treatment preferences. Physical therapists were employed in the acute hospital setting. One hundred and twenty questionnaires were distributed to 24 hospitals in Ireland. Eighty-seven questionnaires were returned (72.5% response rate). Study results showed that the most popular types of exercise therapy for acute low back pain were specific spinal stabilization exercises (38.9% of therapists) and the McKenzie approach (35.6% of therapists). General abdominal exercises were preferred by 11.1% of therapists. Pilates and general aerobic exercises accounted for 3.3% each as a first preference choice. William's flexion exercises were preferred by 1.1% of therapists. If resources were available, 40.9% of therapists responded they would use hydrotherapy, and 31.9% indicated they would carry out group exercise classes. The findings from this survey were compared with the current study's survey. Although the patient example for the current study has a more specific classification than the definition used in this study, the distinction is not great, and general comparisons were still possible.

Summary

The physical therapy literature discussed the following patient education topics for the treatment of low back pain: exercises, activity and work modification, pain control, explanation of the physical cause of back pain, posture education, general fitness and use of devices and equipment. A commonly used management strategy was the McKenzie approach. One review (Klaber Moffett, 2002) recommended use of a patient

self-management approach. The use of back schools was infrequently described, as was the use of education on general fitness. For exercise instruction, the most commonly used exercises included stretching, strengthening, aerobic, relaxation, abdominal and specific spinal stabilization. The use of neural tension or passive stretching exercises was described in only one study.

Two studies investigated the effect of specific patient characteristics on the content of the patient education program. These characteristics included symptom duration (Li & Bombardier, 2001) and the presence of radiating pain below the knee (Poitras et al., 2005). Symptom duration of less than five weeks was associated with the use of exercises and individual patient education on back care as compared to exercises and work modification. The presence of radiating pain below the knee resulted in a greater likelihood of receiving education for decreasing home activities and for ergonomics/work tasks.

The reviewed studies suggested that other factors could affect the patient education program. One such factor was related to patient impairments. In the study by Dekker et al. (1993), which was previously discussed, the investigators concluded that physical therapists identify impairments as the basis for forming treatment goals and selecting interventions. Other studies found that treatment goals or patient characteristics were factors that affected interventions (including education). Several of the previously described studies (Gahimer & Domholdt, 1996; Poitras et al., 2005; Sluijs, 1991b) found that the content or frequency of patient education varied across the episode of care. Finally, individual physical therapist characteristics were found to be significant in the previously discussed study by Kerssens et al. (1999a). This study found that the number

of instructions given to patients were determined to a greater extent by individual therapists and not by the patient. Taken together, these findings suggest that patient education programs may be related to such factors as patient characteristics and impairments, treatment goals, time period during the episode of care and therapist characteristics.

Patient Education for an Acute Derangement Syndrome (Topic Areas)

The following topic areas for patient education were identified from the literature. For each topic, information was sought for the content and delivery methods of patient education for low back pain. Where possible, this information was sought specific to the low back condition under investigation. Data sources included scientific review studies, randomized controlled trials, clinical trials, case reports and expert opinion. Databases included Medical Literature Analysis and Retrieval System Online (MEDLINE), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science (WOS) and Education Resources Information Center (ERIC). A further source of information included the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). The information attributed to this source was drawn from the "Preferred Physical Therapist Practice Pattern 4F in the Musculoskeletal Category: Impaired Joint Mobility, Motor Function, Muscle Performance, Range of Motion, and Reflex Integrity Associated with Spinal Disorders" (pp. 215-231). In addition, the American Physical Therapy Association provides the *Standards of Practice for Physical Therapy* (2003), and the *Guide for Professional Conduct* (2004).

The majority of studies reviewed were those that applied to the patient example (operational definition) used in the current study. This approach included studies investigating disc lesions and/or acute/sub-acute low back pain. For studies on acute or sub-acute low back pain, the characteristics of the patient population were reviewed to ensure similarity with the patient example. For cases in which the low back pain was not well defined, the study might still have been included in the review. However, a statement explaining the reason for this was included.

Current Condition and Risk Factors

Providing education about the current condition and its risk factors (pathology/pathophysiology, impairments, functional limitations or disabilities) was included among the patient/client-related instructions listed in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001) and in the *Guide for Professional Conduct* (American Physical Therapy Association, 2004). In the previously discussed survey by Poitras et al. (2005) of physical therapists in Quebec, Canada, physical therapists reported they provide this information to their patients with low back pain. A 1994 survey (Battie et al., 1994) in Washington State found that physical therapists perceive that patients who are given a clear explanation of the cause of their back problem will do better. A 2002 article (Klaber Moffett, 2002) on the self-management approach to low back pain stated that physical therapists should address any lingering concerns the patient may have regarding the cause of back pain. More specifically in relation to the patient example, Dr. James Cyriax (Cyriax, 1975), an orthopaedic surgeon in England, advised educating the patient on the mechanics of lumber disc protrusion. Dr. Cyriax founded Orthopaedic Medicine, a clinical

examination system for the diagnosis of soft tissue lesions, and published numerous editions of his influential text, *Textbook of Orthopaedic Medicine,* during the 1900s.

This education was described in more detail in a community clinic program for injured workers with low back pain in Canada (Gill et al., 1994). Individual education and explanations were given about low back pain and current treatment. In addition, a kinesiologist provided education on the principles of the program. The principles included the following: differentiating between pain that will dissipate with activity and pain that should limit activities; the use of strategies that involve systematic progress of exercise/activity and maintaining activities in the presence of pain; and encouragement of a patient locus of control.

In a 2006 article (Nordin, Balague & Cedraschi, 2006) on nonspecific lower-back pain, Dr. Margareta Nordin discussed that patients seek an explanation for their low back pain complaints. Klaber Moffett (2002) stated, "Misconceptions need to be replaced with information that is credible and will provide the patient with confidence to carry out physical activities. In 1986, researchers (Deyo & Diehl, 1986) found that the most common reason patients were dissatisfied with medical care was the lack of a sufficient explanation for their low-back pain. In the introduction to their study on a patient education program for back pain in primary care, Cherkin et al. (1996) stated that offering satisfactory information to patients about their problem is difficult because accurate diagnosis is rarely possible. With a nonspecific diagnosis, there may be uncertainty of prognosis and outcomes for both the clinician and patient (Nordin et al., 2006). However, at least one study (Cherkin et al., 1996) reported high levels of patient satisfaction with a specific type of educational intervention.

In this study (Cherkin et al., 1996), the investigators compared three treatment interventions for patients with low back pain. The treatments consisted of 1) usual care, 2) an educational booklet and 3) an educational session with a nurse. Patients were eligible if they were 20 to 69 years of age, and were visiting the clinic for "back pain," "low back pain," "hip pain" or "sciatica." Less than 15% of patients had duration of pain longer than six weeks (these patient characteristics included features similar to the patient example). The two educational interventions had a similar content, which included the causes of the back pain, the prognosis, the appropriate role of imaging studies/specialty referral and strategies to promote recovery and prevent recurrence. The value of returning to normal activities was emphasized, and exercises such as walking, swimming or riding a stationary bicycle, were also encouraged. Patients were encouraged to formulate exercise goals and record daily progress on a log. As noted, the nurse intervention was similar for content; in addition, however, the nurse could answer a subject's questions about the booklet and help the patient set exercise goals. The nurse delivered a "pep talk" to patients focusing on key points from the booklet. Finally, the nurse called the patient one to three days later to answer any questions and encourage patients in their exercise program. Study results showed that patients were significantly more satisfied with the nurse intervention than usual care. Patients in the nurse intervention group also had higher levels of perceived knowledge. However, there were no significant differences between the groups with regard to worry, symptoms, functional status or health care use.

For purposes of the current study, providing information about the low back pain condition and risk factors is promoted by the physical therapy professional literature.

This education is also described in the low back pain literature. Although evidence for its effectiveness on health care outcomes is lacking, one study showed that providing this information as part of an educational session with a nurse resulted in higher levels of patient satisfaction and perceived knowledge.

Self-Limiting Nature of Low Back Pain and the Importance of Resuming Normal Activities

Historically, advice to patients with acute low back pain included recommendations for bed rest. For instance, Dr. Frederic Kottke (1961) recommended a period of bed rest with traction for treatment of injuries to intervertebral discs.

Some disagreed with the importance of bed rest. Dr. James Cyriax (1975) was an orthopaedic surgeon in England during the mid-1900s. In the sixth edition of his text *Orthopaedic Medicine: Diagnosis of Soft Tissue Lesions,* Cyriax proposed various treatments for orthopaedic conservative medical treatment of disc lesions, including postural prophylaxis, manipulative reduction, reduction by traction, maintenance of reduction and epidural local anaesthesia. He stated, "The aim of conservative treatment is threefold: to get the patient well while (a) out of the hospital, (b) out of bed, and (c) at work" (p. 443). For postural prophylaxis, Cyriax recommended, "the patient must not be turned into a neurasthenic, afraid to move his trunk at all…" (p. 451), and "the purely local nature of the disorder should be explained…" (p. 451) in order to avoid the perception that the condition is incurable and likely to become worse. Patients should continue their previous activities, provided they modify the way these activities are performed to allow maintaining the lumber spine in lordosis. However, Cyriax did recommend that some activities/exercises be discontinued, such as digging, or exercises

that enhance lumbar mobility. Instead, the goal was to hold the lumbar joints in extension during daily activities.

In a similar vein, a new model for the treatment of low back pain was proposed by in a landmark paper by Waddell (1987). In this model, the conclusion was drawn that low back pain appeared to be a benign, self-limiting condition. Waddell suggested a change in management from rest to rehabilitation and restoration of function. An article in the *British Medical Journal*, by a Professor from the Department of Medicine at the University of Washington, stated that this viewpoint represented a change from previous recommendations consisting of bed rest (Deyo, 1996). A physician's 1996 review of the nonoperative treatment of lumbar disc herniation stated, "Passive care with bed rest and narcotic analgesics do not meet the appropriate goals of care" (Saal, 1996, p. 7S).

Relevant to the patient conditions used in the current study, this concept was reinforced by the findings of two other studies. The first was a randomized controlled trial (Evans, Gilbert, Taylor & Hildebrand, 1987) of flexion exercises, education and bed rest for patients with acute low back pain. Patients in this trial had complaints of lumbosacral pain with or without radiating pain in the lower extremity. Mean age was 40.6 years, and 53% of patients had pain duration of less than five days at the time of entry into the study. Patients were placed in one of four treatment groups: 1) exercise and education plus bed rest; 2) exercise and education alone; 3) bed rest alone; and 4) control group. Exercises consisted of Kendall's (Kendall & Jenkins, 1968) flexion routine. Back education was on the anatomy of the spine, positions for resting and ways to modify work positions. As with the exercise program, the education was also based on the lumbar flexion approach. The authors cited Kendall (1968) and Hall's text (1980, as

cited in Evans et al., 1987) as the sources for the back education approach. The bed rest groups (groups 1 and 3) were instructed to remain in bed for at least four days. The control group received the same medications as the other groups, but no further instructions or treatments. Study results showed that the patients who received exercises and education were able to stop their medication sooner than the other groups. No other differences between the groups were found. One drawback to this study is that the distinction between the groups may have been blurred by the tendency of patients in the non-bed rest groups to try bed rest on their own volition. This study supported the use of exercises and education when the goal is to reduce medication use.

In the second study, researchers (Malmivaara et al., 1995) assessed the effect of interventions on acute low back pain. The treatment groups included: 1) group in which two days of bed rest was advised; 2) a group in which an instructional session and home exercise program was given for light back-mobilizing exercises; and 3) a control group that was advised to continue normal activity as tolerated. Study results showed that "continuing ordinary activities within the limits permitted by the pain" (p. 351) was of greater benefit than bed rest or exercises in patients with acute low back pain. There were improved outcome measures for pain, lumbar flexion, perceived ability to work, Oswestry back-disability index and number of days absent from work. However, there were several important differences between the patients in this study and the patient conditions used in the current study. The Malmivaara et al. study did not describe an evaluation procedure for the prescribed exercises; the study population consisted of predominantly women; and the study excluded patients who had a sciatic syndrome or positive Lasegue's sign of 60 degrees or less.

In more recent research, a Cochrane Review (Hagen, Hilde, Jamtvedt & Winnem, 2000) of bed rest for acute low back pain and sciatica was published in 2000. Conclusions were that bed rest compared with advice to stay active has no effect or may have slightly harmful effects on low back pain. In cases of evident clinical signs of nerve root compression, the Paris Task Force (Abenhaim et al., 2000) recommended that patients with severe pain should be referred for a specialized back pain evaluation if usual activities were not resumed after 10 days of strict bed rest. Other than in this circumstance, bed rest for acute low back pain should not be enforced, according to Quittan's review of the literature (2002) for the management of back pain.

A systematic review (Hagen, Hilde, Jamtvedt & Winnem, 2002) of advice to stay active was conducted within the Cochrane Collaboration Back Review Group in 2002. This review sought to evaluate the advice to stay active as a single treatment for low back pain and sciatica. Four studies met the inclusion criteria and were included in the review. The conclusions were that, "Advice to stay active as a single intervention, compared with bed rest or exercises, may have little beneficial effect for patients with acute, simple low back pain, and may not be better or worse than prolonged bed rest for patients with sciatica.... it is reasonable to advise people with acute low back pain and sciatica to stay active" (p. 1741). A more recent evidence-based review (van Tulder, Koes & Malmivaara, 2006) on non-invasive treatment modalities for back pain also concluded that advice to stay active (along with the use of medications) was effective for short-term pain relief and long-term improvement of function in acute, non-specific low back pain.

The importance of resuming normal activities was considered a priority for patient education in the physical therapy model for the treatment of low back pain

proposed by DeRosa and Porterfield (1992) and the self-management approach to back pain described by Klaber Moffett (2002). The goal was an early return to activity while not aggravating the injury (DeRosa & Porterfield, 1992).

Several studies have investigated the effectiveness of this education relative to the concept of the Fear-Avoidance Model of Exaggerated Pain Perception. This model, its place in the rehabilitation of low back injuries and the relevant studies will be discussed in the following paragraphs.

The focus on restoration of function as suggested by Waddell (1987) was to help avoid chronicity of the low back problem. Avoiding chronicity is of major concern for rehabilitation of individuals with work-related injuries, and there is extensive literature on this topic. A recent study (Shaw, Pransky, Patterson & Winters, 2005) found that chronicity was associated with patients' workplace concerns, perceptions of injury severity and expectations for recovery. These factors were assessed within the first few weeks of pain onset and were believed to have the potential of moderating the disabling effects of pain. It was findings such as these that prompted the use of interventions to address these factors.

One such intervention was based on the Fear-Avoidance Example of Exaggerated Pain Perception (FAMEPP) (Lethem, Slade, Troup & Bentley, 1983; Slade, Troup, Lethem & Bentley, 1983). Fear-avoidance was described by Nordin, Welser, Campello & Pietrek (2002) as fear of movement. In a 2003 randomized clinical trial on the effects of a fear-avoidance based physical therapy intervention, researchers (George, Fritz, Bialosky & Donald, 2003) related that, in the FAMEPP example, the emotional reaction component of pain was proposed as the most important factor in determining whether an

individual used a confrontation or an avoidance response to acute low back pain. The avoidance response was perceived as contributing toward the development of chronic disability from low back pain (Lethem et al., 1983; Slade et al., 1983). The Fear-Avoidance Beliefs Questionnaire (FABQ) was developed in 1993 (Waddell, Newton, Henderson, Somerville & Main, 1993). This tool was originally used with patients who had chronic low back pain complaints; however, the researchers suggested it could be used with patients in the acute stage as well, especially in the hope of identifying these beliefs before they became fixed (Waddell et al., 1993).

As noted in the previous paragraph, physical therapy based on this concept was described and investigated by George et al. (2003) as fear-avoidance-based physical therapy intervention. This intervention consisted of patient education (using a fear-avoidance example) and a graded exercise program. The patient education played down the importance of anatomic findings, supported the patient in taking an active part in his/her recovery and counseled the patient that back pain is a common condition. *The Back Book* (Burton et al., 1999) educational pamphlet was used to help explain these principles. The second part of the intervention, the graded exercise program, is discussed in the therapeutic exercises section of this paper. Findings from this study showed that patients who had elevated fear-avoidance beliefs at intake had less disability when treated with this approach. However, fear-avoidance-based intervention, as compared to standard care physical therapy, resulted in more disability for patients who did not have elevated fear-avoidance beliefs.

An educational booklet for patients that promoted the concepts of the self-limiting nature of back pain and the benefits of an early return to activity was investigated in a

randomized controlled trial in England (Burton et al., 1999). Study outcome measures included pain, disability, fear-avoidance beliefs and beliefs about the inevitable consequences of back trouble. The patient conditions included acute, nonspecific low back pain, with or without referred leg pain. Patients with nerve root pain or serious spinal disease were excluded. The experimental booklet (*The Back Book*—described in the previous paragraph), or a traditional booklet, was given to 162 patients. The traditional booklet had information on spinal anatomy, injury and damage, as well as advice to avoid activity when in pain. Other than the type of educational booklet, there were no changes in clinical management. Study results showed that the patients that received the experimental booklet had a significant improvement in fear-avoidance beliefs about physical activity and in beliefs about the inevitable consequences of back trouble. There were no differences between the two groups for measures of disability or pain. However, patients who had initially high fear-avoidance beliefs and received the experimental booklet showed improvements in measures of disability. This study provided limited support for the use of education on the self-limiting nature of low back pain and the benefits of an early return to activity for patients with acute, nonspecific low back pain.

An educational pamphlet based on similar concepts was used in a 2000 study (Hazard et al., 2000) of workers in the state of Vermont who filed reports of occupational back injury. The pamphlet's main goal was to promote self-management and a rapid return to activities and work in the absence of complications. All workers filing a back-related report of injury in the state of Vermont were eligible for this study. Only workers who could be contacted within 11 days of injury and give their consent to participate

were included. The pamphlet was mailed to half the consenters. The other half did not receive pamphlets. There were no other interventions. Follow-up with the participants revealed that the pamphlet had no significant impact on pain, health care visits or work absence. Roughly half of those who received pamphlets thought it contained useful information, but only a small percentage of these patients thought it helped them return to work more quickly.

The effectiveness of education on the self-curing nature of low back pain (as combined with other treatments) was assessed in a 1998 study (Seferlis, Nemeth, Carlsson & Gillstrom, 1998). In this study, the researchers assessed the effects of a manual therapy program, an intensive training program and a general practitioner program for patients with acute low back pain. The general practitioner program included information on the self-curing nature of low back pain. The patients in this group received "rest, sick leave, drug prescription (e.g. analgesics, anti-inflammatory drugs), advice about posture and information about the self-curing nature of the disease" (p. 463). Study conclusions were that patients "significantly improved after one month regardless of conservative treatment programme" (p. 470). However, study findings also showed that patients were less satisfied with the treatment and explanations in the general practitioner program than with the other two programs. Although this study supported education on the self-curing nature of low back pain (as being equal to the other interventions assessed), this was not the only component of treatment in this group. Patients also received sick leave, medications and advice on posture. Consequently, the effect of education alone was difficult to determine from this study.

In summary, the literature supports education on the importance of resuming normal activities. There is a sound evidence-base for communicating this information to patients, especially when compared to giving advice for resting in bed. While systematic reviews reported only minimal beneficial effect for this advice, one study reported improved outcome measures for pain, lumbar flexion, perceived ability to work, Oswestry back-disability index and number of days absent from work.

Education on resuming normal activities (staying active) is often used in combination with education on the self-limiting nature of low back pain. The literature reports mixed outcomes for the effectiveness of these combined topics. When educational pamphlets were used to communicate this advice, outcome results were limited to improving patients' beliefs about activity (over a traditional booklet), or to having no effect (over a control group). However, in patients with elevated fear-avoidance beliefs, the use of this education (combined with with a graded exercise program) was associated with improvements in disability (over standard-care physical therapy).

Plan of Care

A review (Nordin et al., 2006) of evidence-based treatment for nonspecific low back pain discussed the importance of patient education on the choice of treatment and the anticipated results of treatment. Education regarding the plan of care was also recommended by the American Physical Therapy Association in the *Guide to Physical Therapist Practice* (2001); in the *Standards of Practice for Physical Therapy* (2003); and in the *Guide for Professional Conduct* (2004). That this information may be important was supported by the results of a 1998 study (Payton, Nelson & Hobbs, 1998) of patients'

perceptions of their relationships with health care professionals. Study findings were that a significant number of patients did not know what to expect for their own and the physical therapist's role in therapy. The researchers suggested that some patients might have an unclear picture of the nature of the physical therapy profession and that more patient education at the beginning of therapy could help to clarify these expectations.

In a previously discussed survey (Chase et al., 1993), researchers found that a majority of physical therapists reported they frequently discussed the rationale for treatments with their patients. This survey assessed perceptions of physical therapists toward patient education and consisted of a random sample of American Physical Therapy Association members nationwide from a variety of practice settings.

Other studies on physical therapy patient education have not specifically identified education on the plan of care, although it may have been categorized under a different heading.

In conclusion, research supports that patients may lack knowledge regarding what to expect for their own and the physical therapist's role in therapy. Patient education on the choice of treatment and the anticipated results of treatment is considered important within the profession. While one study found that physical therapists provide selected aspects of this education, the influence of this education on health care outcomes is not known.

Importance of Patient Participation in Setting Management Goals and Resuming the Patient's Personal Goals

The importance of patient participation in the planning, implementation and assessment of the intervention program was emphasized by the American Physical

Therapy Association in the *Guide to Physical Therapist Practice* (2001); in the *Standards of Practice for Physical Therapy* (2003); and in the *Guide for Professional Conduct* (2004).

Nordin et al. (2002) in an article on self-care techniques for acute low back pain, stated, "Patients should be encouraged to form a partnership with the health care provider. This means that it is understood that the patient has equal responsibility for the outcome of treatment with the provider." This aspect of patient-provider relationship has been called a collaborative relationship. The physical therapy literature suggests that collaboration is important for patient compliance with the treatment program. Two studies (Alexandre, Nordin & Hiebert, 2002; Sluijs et al., 1993) found that one of the main factors related to patients' adherence to the treatment program or home exercise regimen was the barriers patients perceived. Sluijs et al. (1993) stated that physical therapists who were unaware of patients' perceptions could not help to resolve the problems that patients might encounter. Physical therapists should work together with patients to find ways for dealing with anticipated difficulties (Alexandre et al., 2002). The author of a 1980 article on interviewing in physical therapy discussed the importance of setting an open atmosphere that encouraged communication (Croft, 1980). Additionally, the physical therapist should use appropriate body language conveying acceptance and a positive attitude. Finally, the use of open-ended questions helps the patient express his reactions and emotions.

Researchers in a study (Baker, Marshak, Rice & Zimmerman, 2001) of patient participation in physical therapy goal setting reported that physical therapists believed patient participation in setting management goals was important and would enhance the

effectiveness of treatment. The patient population in their study also reported that participation was important to them. However, one of their study's conclusions was that these beliefs might not translate into practice. This conclusion was supported by the research findings from a previously discussed study by Payton et al. (1998). In their study of patients' perceptions of their relationship with health care professionals, 68% of patients reported they would like to be more involved in goal setting with their therapist, yet only 18.3% of patients reported this involvement.

Various explanations have been put forth to help explain the discrepancies between therapists' beliefs and clinical practice. Payton et al. (1998) suggested that the amount of involvement desired by patients might be idiosyncratic to each individual. They concluded therapists should seek to understand each patient's needs for involvement. Another possible reason for non-collaboration between therapist and patient could result from the lack of training for physical therapists in this area (Baker et al., 2001). Another reason might lie in the underlying philosophy of care, in which health care providers could choose to take responsibility for solving their patients' problems (Anderson & Funnell, 2005).

To summarize, research suggests that patients' adherence to the physical therapy treatment plan may be affected by their perceptions of barriers to participation. These barriers could be addressed by a collaborative relationship between therapists and patients. Physical therapists and patients alike believe patient participation in goal setting is important. Although considered important, this education may not routinely take place, and reasons for this lack of collaboration have been suggested. No studies were

identified that investigated the relationship between this education and health care outcomes of physical therapy.

Health, Wellness and Fitness

Risk factors for low back pain include physical fitness and comorbidity (Cady, Bischoff, O'Connell, Thomas & Allan, 1979), and smoking and obesity (Deyo & Bass, 1989). A twenty-five year prospective cohort study (Harreby, Hesselsoe, Kjer & Neergaard, 1997) performed in Denmark revealed that there was a reduced risk of low back pain in subjects who exercised at least three times per week during their leisure time. In an article on self-care techniques for management of acute low back pain, Nordin (2002) discussed teaching patients about self-care monitoring for perceived exertion in an aerobic training program. Education regarding health, wellness and fitness programs is also included as a potential patient/client-related instructional topic for spinal disorders by the American Physical Therapy Association in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). A 1999 study (Kerssens et al., 1999a) of physical therapy practice in the Netherlands showed that physical therapists include instructions on general fitness for their low back pain patients. However, this information figured less prominently than advice on other topics such as pain management, back care in activities of daily living and exercise.

Research findings suggest that patient education on health, wellness and fitness may be considered for patients with low back pain. The epidemiologic literature shows an association between decreased levels of fitness and the risk of low back pain. The physical therapy professional literature supports this education for patients with low back pain. Although an association between an individual's level of fitness and risk of low

back pain has been shown, no studies were found showing that education on health, wellness and fitness is effective for the treatment of low back pain.

Pain Control

The *Guide to Physical Therapist Practice* states that an expected outcome of patient/client-related instruction is that "self-management of symptoms is improved" (American Physical Therapy Association, 2001, p. 223). Various means of pain control for low back pain have been proposed. Nordin et al. (2002) recommended the use of hot packs or cold packs for twenty to thirty minutes for patient self-care in the previously discussed article on self-care techniques for the management of sub-acute low back pain. However, the article reported that patients should be advised that these modalities were for pain control only and that an active approach was the optimum management strategy. Additionally, a textbook chapter (Michlovitz & von Nieda, 2006) recommended cryotherapy for acute injuries, while heat was contraindicated for these injuries.

A 2006 review (French, Cameron, Walker, Reggars & Esterman, 2006) of superficial heat and cold for low back pain from the Cochrane Database of Systematic Reviews related that these therapies were inexpensive, easy to apply and could be used both in the clinic and at home. For the studies that were included as part of this review, patients had to be 18 years of age or older, and have non-specific low back pain. The low back pain could be acute, sub-acute or chronic. Studies with patients having diagnoses of specific pathology or low back pain with radiculopathy were excluded. Study conclusions were that the evidence base for the use of heat and cold was not strong. There was moderate evidence to support the use of continuous heat wrap therapy in patients with acute and sub-acute low back pain. Exercises in conjunction with

continuous heat wrap therapy resulted in further reductions of pain and improvement in function. No conclusions could be drawn about the use of cold due to the limited number and quality of studies on the subject. Differences between heat and cold could not be determined from this review.

The previously discussed study by Poitras et al. (2005) found that a majority (over 75%) of physical therapists reported pain control as one of the educational topics provided during the episode of care for patients with acute or sub-acute work related low back pain. Kerssens et al. (1999a) also reported that advice on pain management was frequently used for patients with low back pain. In the latter study, the most common types of instructions for pain management included resting to avoid pain and doing analgesic exercises.

In conclusion, physical therapists have reported that advice on pain control is part of the patient education program for low back pain. The strategies used/recommended for pain control may include information on rest, analgesic exercises and the use of heat and cold packs. Although commonly recommended, a recent review from the Cochrane Database stated minimal information was available regarding the effectiveness of heat and cold. No information was found in the literature regarding the effectiveness of advice for rest or analgesic exercises in controlling low back pain.

Use of Devices/Equipment

For the current study, devices and equipment were defined according to the categories used in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001), as adaptive, assistive, orthotic, protective or supportive devices. These items could include lumbar rolls, static and dynamic splints, canes, crutches,

walkers, corsets, elastic wraps, supportive taping, environmental controls, seating systems, *et cetera*.

Kottke (1961) described the use of corsets in the treatment of mechanical low back pain. Mechanical causes of low back pain were felt to occur from damage to structures in the back, including herniation of the lumbar intervertebral disc (this condition was felt to occur infrequently, although referred pain in the extremities was felt to be quite common). For injuries to intervertebral discs, Kottke advised a period of bed rest with traction, followed by the use of a canvas corset with rigid back steels. The corset was provided for stability and was used to protect the injured tissues from excessive strain brought on by prolonged sitting or bending. In the 1975 edition of his textbook, Cyriax (1975) recommended the use of a plaster jacket, perforated plastic corset, or corset, but only after the disc lesion had been reduced. The purpose of the corset was to maintain the reduction. Although historically recommended, only 6.4% of physical therapists in Ontario listed a lumbar corset as a treatment preference for a hypothetical patient with acute low back pain and sciatica (Li & Bombardier, 2001).

A 2006 evidence-based review (van Tulder et al., 2006) assessed the outcome of non-invasive modalities, including lumbar supports, on back pain. Lumbar supports have been used to correct deformity, limit spinal motion, stabilize part of the spine, reduce mechanical uploading and for other purposes. The researchers found no trials that assessed the effectiveness of lumbar supports for acute, non-specific low back pain. For mixed populations of acute, subacute and chronic low back pain, there was moderate evidence that lumbar supports were not more effective in decreasing pain than other types of treatment.

The use of proper support for seated postures has been suggested by many (Cyriax, 1975; Kottke, 1961; McKenzie & May, 2003). In an article on mechanical low back pain, Kottke (1961) suggested the use of properly contoured chairs for support of the pelvis and recommended the use of a pad behind the low back while sitting in an automobile seat. Cyriax (1975) suggested better designs for car seats and advocated the use of a lumbar support for seated postures. In the 2003 edition of their textbook, McKenzie and May (2003) discussed the role of lumbar supports or rolls for management of posterior derangement syndromes.

The previously discussed study by Poitras et al. (2005) found that physical therapists recommended the use of devices and equipment for their patients with low back pain. In this study, physical therapists in Canada were surveyed regarding the management of patients with acute or sub-acute low back pain (with or without radiating pain below the knee) over the episode of care. As explained previously, the patient population consisted of workers with low back pain. Physical therapists were asked to complete a clinical management questionnaire to describe the treatment of the two eligible workers with acute or sub-acute work-related low back pain. For a patient without radiating pain, 30% of physical therapists responded they included instructions on the use of a lumbar roll, and 7.4 % included instructions on the use of a lumbar corset. For a patient with radiating pain, 43.9% of therapists responded they included instructions on the use of a lumbar roll, and 11.5% of therapists included instructions on the use of a lumbar corset.

Taken all together, the literature shows that devices such as corsets have been historically recommended for the treatment of mechanical low back pain and disc lesions.

Additionally, the use of lumbar pads, supports or rolls have been advocated in the past, and, as recently as 2003, for seated positioning. Research findings indicate that some physical therapists choose to instruct their patients in the use of a lumbar roll or corset in the management of acute low back pain. No evidence was found for the effectiveness of these devices or equipment.

Activity Modification: Use of Rest Periods during Activities and Altering the Rate or Pace of Performing Activities

The *Guide to Physical Therapist Practice* states that an expected outcome of patient/client-related instruction is that the "ability to perform physical actions, tasks, or activities is improved" (American Physical Therapy Association, 2001, p. 223). A report by a national group, the Panel on Musculoskeletal Disorders and the Workplace (National Research Council and the Institute of Medicine, 2001), was published in 2001. This study was supported by the National Academy of Sciences and the U.S. Department of Health and Human Services. The panel concluded, among other factors, that frequent bending and twisting movements and rapid work pace constituted risk factors for low back disorders. Education on risk factors is recommended for patient/client-related instruction in *The Guide to Physical Therapy Practice* (American Physical Therapy Association, 2001). Physical therapists may use their knowledge of risk factors to develop management strategies for low back pain. In an article on "Self-care techniques for acute episodes of low back pain," Nordin et al. discuss how recommendations for activity limitations are often provided based on the "patient's symptoms, activity requirements, such as work tasks, and the practitioner's beliefs" (2002, p. 95).

Consequently, physical therapists could choose to advise patients to alter their activities for bending/twisting movements and/or rapid work pace.

In the previously discussed study by Poitras et al. (2005), physical therapists in Canada reported they provided recommendations to their patients regarding activity level. This study found that physical therapists' advice differed depending on the characteristics of the low back condition. While in general, therapists advised patients to *increase* their home or work activities, this advice differed for patients with radiating pain below the knee. In this case, a greater number of therapists recommended *decreasing* activities at home for patients. The study researchers stated they believed this variation was due to therapists' taking a more cautious approach for workers with radiating pain.

The International Paris Task Force on Back Pain recently published a report titled "The Role of Activity in the Therapeutic Management of Back Pain" (Abenhaim et al., 2000). The report cited an article by Campello, Nordin and Weiser in 1996 for a theoretical example for the effects of activity level on back pain. The example proposed that the relationship between activity level and back pain could be depicted using a U-shaped curve, where both too much and too little activity are harmful to the back.

The Paris Task Force stated there was only indirect evidence to support this theory. Further research was needed to help clarify the role of activity and rest (and consequently, the appropriate advice for patients) in low back pain. This dilemma was well stated by the Paris Task Force: "...which activity? for which patients? prescribed by whom? when? with what follow-up?" (Abenhaim et al., 2000, p. 4S). The task force attempted to answer some of these questions. The following paragraph summarizes the results of their findings specific to acute (< 4 weeks) low back pain in the absence of

sciatica (sciatica was defined as low back pain radiating to a precise and entire leg dermatome, with or without neurological signs).

The Paris Task Force (Abenhaim et al., 2000) concluded that bed rest should not be prescribed, but is authorized if the level of pain indicates it. If used, bed rest should be both intermittent and of minimal duration. For activities of daily living (defined as activities associated with personal care, eating and normal daily household activities), patients should be encouraged to maintain or resume their usual activities as far as pain allows. The prescription of active exercises was contraindicated in all cases of acute low back pain in the first week. In the absence of scientific evidence for return to work in acute low back pain, return to work was authorized, but not recommended.

To summarize this section, frequent bending and twisting movements and rapid work pace are believed to be associated with the risk of low back disorders. At least one research study showed that physical therapists make recommendations concerning activity level for their patients with low back pain. Although recommendations are made, there are still many questions regarding the role of activity and rest. The only evidence-based consensus to date appears to be to encourage patients to resume their usual level of activity for activities of daily living (within pain constraints). No studies were found that investigated the effect of education on altering the rate or pace of performing other types of activities.

Altering the Amount of Loads/Forces Acting on the Lumbar Spine

Excessive levels of physcal stress (forces or loads) have been suggested as a mechanism of tissue injury (Mueller & Maluf, 2002). Thus, patient education for how to alter loads may be considered with the intention of avoiding injury or re-injury. Physical

stresses suggested as capable of producing excessive loads on the lumbar spine include the single application of a high load, the repetitive application of a relatively low load or the sustained application of a load (McGill, 1997). Factors that could modify the levels of physical stress include movement and alignment factors (including posture), extrinsic factors, psychosocial factors and physiological factors (Mueller & Maluf, 2002). Sustained loads could occur with the use of prolonged seated postures (McGill, 1997). The authors of an article (Pope, Goh & Magnusson, 2002) on spine ergonomics relate that continuous sitting in one position is a risk factor for low back pain. There are physiologic reasons to periodically change one's working posture, including improved disc nutrition and soft tissue tone (Pope et al., 2002). A recent review (Klaber Moffett, 2002) of patient education for low back pain also cited research findings in support of frequent changes of position. These recommendations were backed by the conclusions of a biomechanical study, in which prolonged static loads in flexed postures were believed to present a risk of fatigue injury to the posterior annulus of the disc (Callaghan & McGill, 2001). Consequently, the investigators advised periodic standing, used alternatively as a rest from sitting, to help avoid excessive loading of passive tissues. Another suggestion was to use walking as a rest activity from prolonged sitting or standing. The benefits of walking for individuals with acute low back pain were discussed by researchers in a 2003 study (Taylor, Evans & Goldie, 2003). In this study, individuals with acute low back pain reported decreased levels of pain after ten minutes of treadmill walking at a self-selected speed.

Altering the amount of loads/forces acting on the lumbar spine may also include education for lifting activities. Advice to keep loads close to the body while lifting has

been recommended in order to reduce the load on the spine (Klaber Moffett, 2002). This advice was supported by the aforementioned report of the 2001 Panel on Musculoskeletal Disorders and the Workplace (National Research Council and the Institute of Medicine, 2001). The panel stated that epidemiologic studies have shown that the greatest risk for injury exists when "...loads are lifted from low heights, when the distance from the load (moment) is great, and when the torso assumes a flexed, asymmetric posture" (p. 6).

Patient education for altering the amount of loads/forces acting on the lumbar spine has been described in the literature. In the previously discussed study by Kerssens et al. (1999a), the investigators reported the use of education on how to avoid overloading the back. This education was described as a possible component of physical therapy patient education programs for low back pain. Unfortunately, the specific content of the education was not described.

To summarize, scientific evidence from studies of physiology, biomechanics and epidemiology imply that advice to alter the amount of loads/forces acting on the lumbar spine would be beneficial for healing in patients with low back pain. The low back pain literature recommends avoiding use of prolonged seated postures, excessive loads during lifting activities and awkward positions. One study has identified this educational topic as a possible component of patient education programs for the treatment of low back pain. No studies were found that directly investigated the effects of this education for patients with low back pain.

Role of Imaging Studies and Specialty Referrals

Of a sample of Belgium's population, 42% believed that "x-ray and imaging tests can always identify the cause of back pain" (Goubert, Crombez, & De Bourdeaudhuij,

2004, p. 388). This belief has been identified as one of the myths about low back pain (Deyo, 1998). The relationship between low back pain symptoms, imaging results and anatomic or physiological changes is not strong, and imaging studies generally focus on ruling out extreme causes of pain such as cancer or infection (Deyo, 1998). Abnormalities such as herniated discs are often found in asymptomatic people (Jensen et al., 1994), making imaging interpretation difficult (Deyo, 1998). In an article on the treatment of nonspecific lower-back pain, Nordin et al. (2006) suggest a biopsychosocial treatment model that includes identifying patient expectations, explaining relevant concepts and addressing misconceptions (such as the use of imaging or special tests to explain the cause of back pain). Providing information on the role of imaging studies and specialty referrals formed part of the patient education program in a previously described research study by Cherkin et al. (1996). However, no studies were found that investigated the effectiveness of this education separately from other recommendations or interventions.

Stress Management and Relaxation

The Panel on Musculoskeletal Disorders and the Workplace (National Research Council and the Institute of Medicine, 2001) stated that the presence of job stress was associated with the occurrence of low back disorders in the workplace. This aforementioned study was supported by the National Academy of Sciences and the U.S. Department of Health and Human Services. For lowering the risk of low back disorders, the Panel's conclusions were that the weight of the evidence justified the use of interventions that reduced physical as well as psychosocial stressors. The Panel suggested specific interventions such as engineering controls, training and administrative

controls. Administrative controls could help to control stress by using worker rotation and ramping in of work, process control and light duty or transitional work assignments.

These concepts could be used in developing patient education programs for patients with low back pain. Nordin et al. (2002) described several relaxation techniques that could be used in the self-care of patients with sub-acute low back pain. The techniques included relaxation exercises such as deep breathing, creative visualization and progressive muscle relaxation (Nordin et al., 2002). Education regarding stress-related problems was also identified as a patient education topic by Emmy Sluijs (1991a) and by Gahimer and Domholdt (1996) in studies of patient education in physical therapy practice.

In conclusion, advice on stress management and relaxation could be considered for patients with low back pain based on the relationship between job stress and low back disorders. Studies document that this education occurs in physical therapy practice. No studies were found that directly examined the effect of this education on patients with low back pain, so there is only indirect evidence for its use.

Posture and Positioning

Education on posture and positioning has been reported in the physical therapy literature. Several studies on patient education in physical therapy practice identified education on posture or positioning as a component of patient education programs (Chase et al., 1993; Gahimer & Domholdt, 1996; Sluijs, 1991a). More than half of the physical therapists who were surveyed in Canada on the management of work-related low back pain reported that they provided posture education at least once during the episode of care (Poitras et al., 2005). The study population included workers with acute or sub-acute low

back pain, with or without radiating leg pain below the knee. A retrospective study of physical therapy patient records in England also identified postural advice as a component of low back treatment programs (Jackson, 2001).

Sedentary occupations have been associated with an increased risk of symmetric disc degeneration (Videman, Nurminen & Troup, 1990). Unsupported sitting assessed with electromyography, measurement of spine kinematics and use of a complex biomechanical modeling system revealed an increase in compressive forces on the low back in sitting as compared to standing (Callaghan & McGill, 2001). This difference in joint loading was attributed to the increased flexed posture of the spine in the seated position (Callaghan & McGill, 2001). The static nature of these forces in a prolonged, unsupported seated posture was of concern (Callaghan & McGill, 2001). Use of a chair that allows individuals to alter their seated posture easily was suggested (Callaghan & McGill, 2001; Pope et al., 2002). The effects of different types of office chairs on trunk kinematics, trunk extensor electromyography and spinal shrinkage were investigated, suggesting a possible advantage of dynamic chairs over fixed chairs (Van Dieen, De Looze & Hermans, 2001).

This epidemiological and biomechanical information was in line with previous recommendations for sitting postures. Cyriax (1975) advocated the use of postures in sitting and lying that supported the normal lumbar lordosis. Cyriax also recommended the use of a properly designed seat in cars, trains, airplanes, theatres, *et cetera.* McKenzie and May (2003) recommended correction of sitting posture from the kyphotic sitting position. Symptoms should be monitored as the posture correction is applied (McKenzie & May, 2003). In situations of posterior derangements, where flexed

postures caused a return of symptoms, posture correction, use of a lumbar roll and interruption of prolonged sitting were all recommended strategies to help maintain the reduction of the derangement (McKenzie & May, 2003).

In contrast, Klaber Moffett (2002) cited new research findings that challenged the traditional and commonly used advice to sit up straight. Researchers in a single-subject design found that intradiscal pressures for sitting relaxed were less than in sitting and actively straightening the back (Wilke, Neef, Caimi, Hoogland & Claes, 1999). Sitting with maximum flexion had the highest pressure readings, while sitting slouched into the chair had the lowest readings (Wilke et al., 1999). For formulating a patient education program, Klaber Moffett (2002) concluded it seemed the most important advice for seated postures was to change positions frequently.

In conclusion, scientific evidence supports patient education in posture and positioning for seated postures. Leaders in the field of low back pain management advocate the use of this education. Physical therapists report that they provide this information to their patients; however, direct evidence for the effectiveness of this advice is lacking.

Ergonomics/Work Modifications

Of specific interest to the patient example under investigation is the ergonomics of seated postures. Cyriax's (1975) recommendations for ergonomic modifications included a desk stand to be used by office workers for reading while seated at a desk. Pope et al. (2002) discussed how seated postures depended on such factors as the chair design, sitting habits, the task, seat height and inclination, backrest position and other supports. As discussed in previous sections, the chair should allow easy alterations in

positions (Pope et al., 2002). Inclining the backrest backward reduces intradiscal pressure, while use of a backrest for support of the lordosis also reduces intradiscal pressure (Pope et al., 2002).

Ergonomics instruction for the patient example could also include other topics. Advice for lifting is discussed in the next section. Ergonomic modifications to promote axially symmetric postures have been recommended for prevention of low back disability in the workplace (Pope et al., 2002). Additional considerations for ergonomics have included categories such as pushing/pulling activities and whole body vibration (Pope et al., 2002). Since these factors were considered less likely to play a major role for the patient example, they were not evaluated further.

Several studies of patient education in physical therapy practice described patient education on ergonomics or a similar topic. Chase et al. (1993) found that simulating home or occupational situations could be a component of patient education programs. Additionally, advice regarding work was identified by two studies of physical therapy practice (Gahimer & Domholdt, 1996; Sluijs, 1991a). This education also figured among studies of physical therapy patient education for low back pain (Li & Bombardier, 2001; Poitras et al., 2005).

In conclusion, advice on ergonomic modifications for the patient example was considered applicable since the patient had risk factors for injury (for example, prolonged sitting posture at work and periodic lifting tasks at home). Indirect support for patient education in the ergonomics of sitting postures exists in the form of scientific data. Studies have found that education on ergonomics or work modification is reported in physical therapy practice (for general purposes and for patients with low back pain). No

studies were found that specifically examined the effect of this patient education for patients with low back pain. Advice on lifting techniques is considered in the next section.

Body Mechanics

Patient education in body mechanics often involves instructions for lifting properly. As noted in the section on "Advice on Altering the Amount of Loads/Forces Acting on the Lumbar Spine," epidemiologic studies have shown the deleterious effects of high loads on the lumbar spine. Patient education based on this concept could include advice to limit the amount of weight lifted, to use the optimal lifting technique or to avoid lifting altogether. Education on the "proper" lifting technique has been debated (Pope et al., 2002). Among the recommendations are to: hold the object as close to the body as possible (Lorenz, Lavender & Andersson, 2002; Pope et al., 2002); use a smooth lifting technique without jerking motions (Lorenz et al., 2002; Pope et al., 2002); and avoid twisting motions of the back and turn with the feet instead (Lorenz et al., 2002; Pope et al., 2002). The relative advantages of lifting with the knees as compared to a back-stooped posture have been under debate (Klaber Moffett, 2002; Pope et al., 2002). In a previously discussed paper on self-care recommendations for acute low back pain, lifting activities and awkward positions were to be avoided (Nordin et al., 2002).

Although considered a possible educational topic for the patient example, physical therapy studies on patient education (for general purposes and for low back pain management) did not specifically identify lifting instructions as a part of patient education programs. However, this instruction could have been included as a component of other topics, such as "general advice," "information on how to avoid overloading the

back," "instructions and advice," "advice and information on work," "ergonomics/work tasks," "work modification," "simulating home and/or occupational situations," "activities of daily living," "activities at home/work" and "body mechanics."

Other educational topics that fall under the category of body mechanics could include instructions on how to modify activities of daily living (bathing, dressing, eating, *et cetera*), and instrumental activities of daily living (household chores, yard work, shopping, caring for dependents, *et cetera*) so as to minimize stresses on the spine. Cyriax (1975) recommended maintaining the lumbar lordosis for dynamic movements such as lifting, forward bending, scrubbing the floor, crouching, tying one's shoelaces, working at a table, standing at a bench, carrying objects and pushing a lawnmower. McKenzie and May (2003) discussed that the usual aggravating factor in posterior derangements was flexion. The use of prolonged flexed postures or repetitive flexed movements could cause a return of symptoms (McKenzie & May, 2003). After reduction of the derangement, treatment should focus on posture correction, the use of a lumbar roll, interruption of prolonged sitting and avoidance of repetitive flexion (McKenzie & May, 2003).

Biomechanical counseling for patients with low back pain was one of the treatment objectives suggested by DeRosa and Porterfield (1992) in a physical therapy model for the treatment of low back pain. In this model, low back pain was considered to be an activity-related spinal disorder, for which the emphasis should be on identifying the mechanical stresses that provoked symptoms. The exact identification of the tissues involved was not perceived necessary. Other treatment objectives included pain modulation, the application of controlled forces to enhance movement and enhancing

neuromuscular performance. Patients should be instructed in patterns of movement that minimize stress on the spine. Patient self-management of symptoms and an active exercise program were advocated as part of this instruction.

Studies of physical therapy practice have reported the use of patient education for body mechanics. This education was reported in general practice (Chase et al., 1993) and for treatment of low back pain (Battie et al., 1994). Other studies may have included this education under a different name: as "correct posture and movement" (Gahimer & Domholdt, 1996, p. 1093); or "how to alternate body position during daily activities" (Kerssens et al., 1999a, p.290).

The previously discussed study by Poitras et al. (2005) examined the treatment choices of physical therapists in Quebec, Canada. Therapists were asked to complete a clinical management questionnaire for the first two eligible patients with acute or sub-acute work-related low back pain (one each for a patient with and without radiating pain below the knee). Approximately 30% of therapists reported that they used simulations of activities of daily living and simulations of work tasks at least once during the episode of care for both types of patients. An even higher percentage of therapists reported that education in activities of daily living and ergonomics/work tasks were provided at least once to patients. For treatment of a patient without radiating leg pain below the knee, 70.5% of therapists reported they used education on activities of daily living at least once during the episode of care. This percentage increased to 79.9% of therapists for treatment of a patient with radiating pain below the knee. For education on ergonomics/work tasks, these percentages were 67.4% of therapists treating a patient without radiating pain below the knee and 56.8% of therapists treating a patient with radiating pain below the knee.

Interestingly, the frequency of use of these topics of education varied across the episode of care. For both groups of patients, there was a higher frequency of use for education on activities of daily living during the initial episode of care than for the latter part of the episode of care. For patients without radiating pain (below the knee), there was a decreased frequency of use for education on ergonomics/work tasks as the episode of care progressed. For patients with radiating pain, frequency of use for education on ergonomics/work tasks showed a nonsignificant change. Since physical therapists in the current study were asked to describe the patient education they would recommend for the patient example over the *initial* two weeks of care, the study by Poitras et al. would suggest an increased focus on education for activities of daily living than for ergonomics/work tasks during this time period.

To summarize, the orthopaedics/low back pain literature supports the use of patient education in body mechanics for lifting and other activities. This education is described as an educational topic in general physical therapy practice and for the treatment of low back pain. No studies were found that directly assessed the effects of this education on patients with low back pain.

Therapeutic Exercises

Numerous studies advocate the use of exercises in the treatment of acute or sub-acute low back pain. Although therapeutic exercise may be considered a separate intervention (and is classified as a separate intervention in the Guide to Physical Therapist Practice (American Physical Therapy Association, 2001)), it was included in the current study because instructions normally accompany exercises. From the patients' point of view, learning about which exercises to perform, how to perform them and why

they are important is likely considered part of their education. As a result, the type of exercise, method of instruction and exercise rationale became important as one of the focuses of the current study.

The following is a review of the literature on the use of therapeutic exercises for the treatment of the low back condition under investigation. There were several difficulties with such a review, which will be explained. In the past, researchers tended to use pathology-based diagnoses as the basis for their research studies. More recently, researchers have used non-specific diagnoses or subgroup classifications (of low back pain) as the basis for their research. Consequently, the literature contained studies of various types. The pathology most closely related to the low back condition under investigation in the current study is that of an acute disc derangement. Studies that investigated acute disc lesions were reviewed. For studies that used non-specific diagnoses or subgroup classifications, the patient population was evaluated to determine the extent to which the patient conditions in these studies were similar to the patient conditions used in the current study. If similar, these studies were included in the review. This was especially important because the patient example was only categorized as a derangement syndrome. A definitive diagnosis for the patient example was not given. This was felt to reflect actual practice, in which definitive diagnoses are often elusive (Spitzer, 1987).

Opinion as to what causes disc derangements and how to treat them has changed over time. Consequently, some exercises that were recommended in the past are no longer considered appropriate. These exercises were still included in the review because it was possible they continued to be used.

A related area of discrepancy concerned the method of assigning exercises to patients. Some studies investigated the use of exercises in general, without differentiating among the different types of exercise approaches. Other studies examined a specific type of exercise approach, but might or might not use patient examination findings to help guide this approach. For instance, patients could demonstrate the centralization phenomenon, which has been associated with a specific type of subgroup classification (derangement syndrome) and exercise approach. Some research studies assessed for the presence of the centralization phenomenon in prescribing exercises, while others did not. Since opinion was divided among the research community about the importance of factors such as these, the findings of many studies were open to interpretation.

Therapeutic exercises have been classified in different ways. For example, an exercise such as a partial sit-up, could be viewed as a strengthening exercise, a spinal flexion exercise or a postural exercise. Accordingly, summarizing research findings was challenging and there was considerable overlap among the types of exercises discussed. A detailed description of the exercises was not provided, leaving the reader to rely on previous knowledge of the subject in order to interpret the study findings. These limiting strategies were used in the interest of brevity and because therapeutic exercises were not the sole focus of this study.

A final area of difficulty was that many studies assessed the effect of more than one type of intervention, for example, the use of exercises along with back care instructions and the like. These studies were generally not included in the literature review.

General Exercises for Acute Low Back Pain

There have been a number of systematic reviews on low back pain. One of these was performed by researchers who investigated exercise therapy for low back pain (van Tulder, Malmivaara, Esmail & Koes, 2000). This study was a systematic review of randomized controlled trials. Inclusion criteria for the study were randomized controlled trials that involved subjects 18 to 65 years of age and who had presence of nonspecific low back pain, with or without radiation to the lower extremities. Exercise therapy included the following types of exercises: specific back exercises, abdominal, flexion, extension, static, dynamic, strengthening, stretching or aerobic. Of the twelve studies examining exercises for acute low back pain (acute was defined as a duration of twelve weeks or less), some included a population with low back pain only, some with radiating symptoms and many with a mixed population of patients with and without radiating leg pain. Concluding statements by the authors regarding their findings were that there was strong evidence that exercise therapy was not more effective than other treatments (active or inactive). Seven of the studies reviewed by van Tulder et al. (2000) were included in the literature review for the current study (Cherkin, Deyo, Battie, Street & Barlow, 1998; Evans et al., 1987; Malmivaara et al., 1995; Seferlis et al., 1998; Stankovic & Johnell, 1990; Stankovic & Johnell, 1995; Waterworth & Hunter, 1985). These studies are discussed elsewhere in this paper.

A systematic review of conservative interventions for subacute low back pain was published in 2002 (Pengel, Maher & Refshauge). Inclusion criteria for the studies were as follows: 1) only randomized controlled trials were included; 2) patients had subacute (seven days to six months duration) nonspecific low back pain with or without referral to

the leg; 3) the study assessed conservative interventions; 4) the study outcomes included pain, disability or return to work; and 5) the study was published in English or Dutch. Out of 89 identified studies, only 13 met the inclusion criteria. These 13 studies were reviewed by Pengel et al. In contrast to the findings of the Cochrane review by van Tulder et al. (2000) for acute low back pain, this review confirmed the efficacy of exercise for patients with subacute low back pain (broadly defined as a time period between seven days to six months). The type of exercises used varied among the included studies.

Only a few studies in the review by Pengel et al. (2002) were included in the current literature review. In most cases, this was because the study population was dissimilar to the patient example. The studies (Chok, Lee, Latimer & Tan, 1999; Klaber Moffett et al., 1999) that were included are described elsewhere in this paper.

A meta-analysis (Hayden, van Tulder, Malmivaara & Koes, 2005) of randomized controlled trials for exercise therapy for nonspecific low back pain was published in 2005. This study defined acute low back pain as being less than six weeks. A total of 11 studies were reviewed, many of which were considered to be of low quality because of insufficient assessor blinding. For acute low back pain populations, conflicting evidence was found for the use of exercises. In a pooled analysis of the trials that had sufficient numerical data, exercise therapy was not found to be effective over other treatments (including no treatments) for pain relief or functional outcomes. Of the 11 studies, the majority were also included in the earlier review by van Tulder et al. (2000), so it is not surprising that the findings between the two studies were similar.

A later review (van Tulder et al., 2006) was published in 2006 that sought to summarize the best available evidence from systematic reviews conducted within the framework of the Cochrane Back Review Group on non-invasive treatments for nonspecific low back pain. Previous Cochrane Reviews were updated with additional trials, if these were available. Study results were similar to the previous reviews by van Tulder et al. (2000) and Hayden et al. (2005). Two of the additional studies described in this 2006 review were included in the current literature review.

Although most of these large review studies did not support the use of exercises for the acute phase of low back pain, there are some important considerations to keep in mind. Some studies that were part of the reviews had populations that were dissimilar to the patient example in the current study. In other cases, the time frame for the intervention was different. Pengel et al. (2002) stated that their review findings "...suggest that the acute and subacute phases of low back pain are different and that effective treatments should be identified specifically for each phase" (p. 817). For the current study, physical therapists were asked to identify the patient education (including exercises) for the patient example during a two-week period commencing at one week following injury. Depending on how physical therapists defined the stage of recovery for the example, this two-week period would most likely correspond to the acute stage, but could overlap with the subacute stage. The current study did not attempt to define the stage of recovery for the patient example. Instead, the patient description supplied a history and patient findings (including information on impairments and the severity of disability) on the initial evaluation. It is this information that has been considered critical

in formulating treatment decisions (Dekker et al., 1993; Delitto et al., 1995; McKenzie & May, 2003; Sahrmann, 1988;).

Roughly half of the studies reviewed did not use a process in which the patient evaluation guided the selection of exercises. Use of a generic treatment program unmatched to patient findings is contrary to the patient/client management process described in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). Studies that have focused on individual elements of physical therapy care do not reflect actual practice (Delitto, 2005) or the philosophical framework of physical therapy (Wand et al., 2004). A generic treatment program does not take into account the variability within the nonspecific low back pain population (Delitto, 2005). The physical therapy literature has shown that patient education, including exercises, is linked to treatment objectives (Dekker et al., 1993) and that treatment objectives/preferences are varied according to patient characteristics in low back pain (Battie et al., 1994; Li & Bombardier, 2001; Poitras et al., 2005). Thus, the design and conclusions of the review studies may not be an accurate reflection of practice and were not consistent with the design of the current study, in which physical therapists were asked to describe the patient education based on the description of a patient example. The review study findings were included here because of the likely impact they have had on clinical practice and because little is known about the relative merits of different exercise approaches. Also, it is not known whether physical therapists responding to the survey actually used an individualized approach in their treatment of the low back condition under investigation.

Flexion Exercises

Historically, conservative management of low back pain included the use of immobilization and bed rest, followed by William's flexion exercises (Williams, 1937a; Williams, 1937b). Dr. Paul Williams emphasized the use of spinal flexion exercises in order to establish a balance between the flexor and extensor muscles (Williams, 1937b). Other rationales for these exercises included opening the intervertebral foramens to reduce pressure on the nerves (Jackson & Brown, 1983). William's flexion exercises were influential for a number of years (Liemohn & Gagnon, 2001). Their recent use has declined, and a survey (Byrne et al., in press) of physical therapists in Ireland found that only a minority of physical therapists listed William's flexion exercises as their preferred exercise therapy for acute low back pain.

Abdominal strengthening exercises, such as the "catback" exercise were advocated during the sub-acute phase of healing from a herniated nucleus pulposis (Nagler & von Estorff, 1987). Jackson and Brown (1983) felt that flexion exercises were not indicated in cases of acute disc prolapse. Others (Caillet, 1962; Nagler & von Estorff, 1987) recommended the use of "knee to chest" exercises during or following a period of bed rest for conservative treatment of a herniated lumbar disk.

Flexion exercises were recommended by Robin McKenzie, a physical therapist in New Zealand, for several purposes (McKenzie, 1981; McKenzie & May, 2003). These purposes included management of anterior derangements, reexampleing of flexion dysfunctions, and restoration of function. In all cases, McKenzie stressed the importance of using symptomatic and mechanical responses to loading strategies in determining the treatment approach. As a result, flexion exercises were only to be used if the

examination findings warranted this approach. Based on the McKenzie theoretical principles, flexion exercises would be considered inappropriate for patients who demonstrated centralization of pain with extension movements. However, flexion exercises could be considered suitable after sufficient healing had taken place, in order to restore function.

Yet, a recent Cochrane systematic review (van Tulder et al., 2000) of exercises concluded that there was moderate evidence for the ineffectiveness of flexion exercises in the treatment of acute low back pain. This systematic review analyzed the findings of three randomized controlled trials (Evans et al., 1987; Farrell & Twomey, 1982; Nwuga, 1982). One of these trials (Nwuga, 1982) was found to have a patient population unmatched to the current study. Another study (Farrell & Twomey, 1982) assessed the combined use of other interventions in addition to flexion exercises. The third study (Evans et al., 1987) is described elsewhere in this paper. Each of these trials did not attempt to differentiate exercise approach based on the results of patients' physical examination findings.

Isometric Flexion Exercises

Kendall and Jenkins (1968) advocated the use of isometric flexion exercises during recovery following lumbar disc prolapse. The reason why these exercises were felt to be effective was an enigma. One suggestion was that strengthening the flexor muscles would contribute to lumbar spine stability. Another theory was that raising intra-abdominal pressure would reduce strains upon the intervertebral disc. However, the most likely reason for the exercises' success was felt to be due to the fact that they were isometric in nature and did not induce movement of spinal structures. The exercises were

reported to be of most benefit to patients who possessed an exaggerated lumbar lordosis in conjunction with lax abdominal muscles. The exercises were believed to help reduce this postural abnormality, thereby reducing stress on the ilio-lumbar ligaments, which was thought to be a common source of pain.

The use of the exercise program advocated by Kendall and Jenkins (1968) was found to be beneficial for patients with acute low back pain in a study by Evans et al. (1987). Patients who received a combined treatment of education and exercises were able to stop their medication use sooner than the other groups in the study (exercises, education, and bed rest; bed rest alone; and control group).

Extension Exercises

The use of spinal extension exercises is a common intervention in the treatment of low back pain. A specific version of these exercises were recommended for the treatment of low back pain as early as the 1950s (Anderson, 1954). Jackson and Brown (1983) cited various sources for the following rationales for extension exercises: maintenance of the normal physiologic curve of the low back allows the spine to tolerate greater axial compression loads; extension movements decrease pressure on the disc; strong back muscles are tied to the ability to lift greater loads; individuals with back pain show a loss of back extensor muscle strength and endurance; flexion postures are associated with onset of back pain; and normal balance of back muscle strength should be restored. As with flexion exercises, some felt that extension exercises were not indicated in cases of acute disc prolapse (Jackson & Brown, 1983).

A recent Cochrane systematic review of exercises concluded that extension exercises were not effective in the treatment of acute low back pain (van Tulder et al.,

2000). Four studies were reviewed as part of this analysis. Three of these studies were included in the current literature review since the patient conditions were similar to the current study (Cherkin et al., 1998; Malmivaara et al., 1995; Stankovic & Johnell, 1990; Stankovic & Johnell, 1995). Of the included studies, one (Malmivaara et al., 1995) is discussed in this section because extension exercises were assigned without respect to patient examination findings. The remaining two studies are discussed in the next section because extension exercises were assigned according to the patient examination findings (Cherkin et al., 1998; Stankovic & Johnell, 1990; Stankovic & Johnell, 1995). This distinction should be noted in the interpretation of the findings from this systematic review.

The study by Malmivaara et al. (1995) showed that the use of back extension and lateral bending movements were inferior compared to advice on continuing ordinary activities (this study was also described previously in the section on "Information of the Self-Limiting Nature of Low Back Pain and the Importance of Resuming Normal Activities"). The exercise group received one session of exercise instruction by a physiotherapist in conjunction with a written home exercise program. As discussed previously, the patient population in the Malmivaara et al. study was distinct from the patient example used in the current study, and the results might not have applied to the patient example. However, in view of some of the similarities among the patient conditions, this study was included in the literature review. Another important treatment consideration brought out by the Malmivaara et al. study was how exercises were assigned to patients. All patients were treated similarly, and exercises were assigned

according to the study protocol and were not based on patient examination findings. These factors could make the findings from this study difficult to interpret.

McKenzie Technique (Patient-Specific Directional Preference Exercises)

Perhaps the individual most well known with respect to the use of extension exercises is Robin McKenzie (McKenzie, 1981). However, as noted previously, the McKenzie method did not advocate extension exercises unless the examination findings were consistent with this approach (McKenzie & May, 2003). The basis for the exercises for use with derangement syndromes was in determining if a particular movement direction was able to produce the centralization phenomenon. McKenzie and May (2003) defined centralization as follows: "In response to therapeutic loading strategies, pain is progressively abolished in a distal-to-proximal direction with each progressive abolition being retained over time until all symptoms are abolished" (p. 167). When centralization was present, this phenomenon has been associated with improved outcomes (Donelson, Silva & Murphy, 1990; Sufka et al., 1998; Werneke, Hart & Cook, 1999). The rationale for the use of movements was to promote centralization of symptoms and reduce the derangement (McKenzie & May, 2003). For patients whose symptoms centralized with spinal extension, the extension principle (which included extension exercises/movements) was advocated (McKenzie & May, 2003).

Several studies have shown that physical therapists use the McKenzie approach for the treatment of low back pain. A survey (Byrne et al., in press) of physical therapists in Ireland found that the McKenzie approach was the preferred exercise therapy for acute low back pain for roughly 35% of physical therapists. A retrospective review (Jackson, 2001) of physical therapy notes from a community-based physical therapy department in

the United Kingdom in 1995-1996 showed that the McKenzie approach was used with 63% of patients with low back pain. The previously discussed study by Poitras et al. (2005) found that 37.4% of physical therapists reported they used the McKenzie approach for patients without radiating pain and 63.3% for patients with radiating pain. The McKenzie approach was one of the most popular methods of management for patients with nonspecific low back pain in a survey of physical therapists in Britain and Ireland (Foster et al., 1999). The literature on the effectiveness of this technique for patients with acute low back pain will be discussed next.

As noted previously, the use of the McKenzie technique in assigning exercises requires the identification of a patient's "directional preference." A directional preference is identified when posture or repeated movements in a single direction cause centralization of symptoms (Long, Donelson & Fung, 2004). This finding has also been used to help categorize the low back condition as a derangement syndrome (McKenzie & May, 2003). Once a patient's directional preference has been established, the McKenzie technique involves the use of sustained positions or repeated movements (exercises) consistent with the directional preference (McKenzie & May, 2003).

Stankovic and Johnell (1990) assessed the effect of the McKenzie method of treatment with patient education in a "mini back school" (p. 120). Patients were admitted to the study if they had acute low back pain with or without leg pain. Patients with chronic low back pain, pregnancy, back surgery, spondylolisthesis, tumors, fractures and neck, shoulder or thoracic pain were excluded. One hundred patients were randomized into two groups. The McKenzie group received treatment according to the McKenzie principle. Components of the treatment included an emphasis on maintaining the

lordosis, performing a prone-lying exercise sequence and performing a postural correction if a lateral deviation was present. Following two weeks, flexion exercises were initiated. Patients were seen for 20 minute visits for an average of 5.5 visits. The back school group received back care education, consisting of one 45 minute session. No exercises were included. The content of the education included the anatomy and function of the back, intradiscal measurements and positioning, use of the semi-Fowler position for resting and advice to keep on the move during the day. Patients were given leaflets. All patients had previously received instruction on ergonomics at their workplace. This study found that the McKenzie method was superior to the "mini back school" for most of the outcome variables, including return to work and number of recurrences of low back pain. A five-year follow-up (Stankovic & Johnell, 1995) to this study found that, although differences between the groups were less, the group that received treatment according to the McKenzie principle continued to have significantly less recurrences of pain. In addition, patients who received treatment according to the McKenzie principle had significantly less sick leave.

Researchers in a 1998 study (Cherkin et al., 1998) compared three interventions for patients with low back pain. Of all the subjects, 59% had had back pain for less than three weeks. Among other factors, patients were excluded if they had mild or no pain seven days after the visit to the physician, sciatica, severe neurologic signs, other conditions/illnesses or had received other treatments for their current low back condition. The treatment groups were as follows: 1) physical therapy (McKenzie approach to classify and treat patients); 2) chiropractic manipulation; and 3) educational booklet (the booklet included information on the causes of back pain, prognosis, role of imaging

studies and specialists and activities for promoting recovery and preventing recurrences). Study results showed that the most common diagnoses in the chiropractic group were sprain or strains (approximately 50%) and facet syndrome (30%). The most common diagnosis in the physical therapy group was "derangement" (92%). Patients receiving the McKenzie method of physical therapy or chiropractic manipulation had only slightly improved outcomes as compared to patients receiving the educational booklet. There was also increased satisfaction with care in the physical therapy and chiropractic groups.

A multicentered randomized controlled trial (Long et al., 2004) was used to investigate the effects of exercises in relieving low back pain. Among the participants were patients with acute, subacute and chronic low back pain, including low back pain only and sciatica. Patients whose assessment did not exhibit a directional preference were excluded. Patients were randomized to exercise groups that were concordant with their directional preference, opposite their directional preference or multidirectional in nature. The group that used exercises concordant with their directional preference had significantly improved outcomes compared with the other two groups.

Two studies (Delitto et al., 1993; Erhard, Delitto & Cibulka, 1994) investigated treatment approaches for patients classified in the extension and mobilization categories. The patients in both studies had acute or subacute low back pain, with or without leg pain. Patients were classified as belonging to the extension category if their back pain intensity decreased (back pain only) or centralized (back pain with leg pain) with at least two extension movements and worsened with flexion movements. These assessment findings are consistent with the patient example. However, patients also had findings that were consistent with a mobilization category. The resulting group of patients belonged to

an extension-mobilization category, which was considered dissimilar to the patient example. In addition, since the two studies actually had few patients who had both back and leg pain, these studies were not examined further as part of this literature review.

Specific Home Exercise Program

A specific home exercise program was evaluated in a research study (Descarreaux, Normand, Laurencelle & Dugas, 2002) for patients with subacute (seven days to seven weeks) and chronic (seven weeks and more) nonspecific low back pain. Two groups of 10 subjects each participated in this trial. Two chiropractors performed the initial evaluations, including assessments for posture, range of motion of the trunk and strength and extensibility evaluation for lumbar and pelvic muscle groups. One group (the experimental group) received instructions for specific home exercises based on findings from the initial evaluation for force and extensibility. Exercises were selected in relation to each patient's initial deficit. Exercise parameters were determined by comparing patients' initial deficits with normative data. All participants in the second, or control group, received general exercises not based on the initial evaluation findings. Five exercises were included and are as follows: 1) flexion mobilizing exercises, 2) passive extension mobilizations, 3) stretching exercises of the erector spinae, 4) abdominal reinforcement exercises and 5) combined back and hip extension exercises. Exercise volume and training intensity were identical for each subject. After a brief familiarization session, all subjects performed their exercises at home twice a day. Subjects in the experimental group received new exercises and upgrades in the training intensity after three weeks of training. A second physical evaluation was performed after six weeks. Results showed that only members in the experimental group significantly

reduced their level of pain and disability. This study supported the use of exercises to address specific deficits in force and extensibility for patients with subacute or chronic back pain. For the current study, these study findings were felt to only indirectly apply to the patient example. Force and extensibility data were not supplied for the patient example, and potential deficits could only be inferred from information on posture. Since this interpretation was believed possible, these exercises could be considered appropriate.

Aerobic Capacity/Conditioning Endurance Exercises

Aerobic exercises have been described as a component of training programs in the treatment of low back pain (Klaber Moffett et al., 1999) and the nonoperative management of a herniated nucleus pulposis (Saal & Saal, 1989). Aerobic capacity/endurance conditioning or reconditioning are described as a component of therapeutic exercises for spinal disorders in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). A 1996 study (Jette & Jette, 1996) found that the use of endurance exercises was a predictor of better outcome among patients with various types of lumbar impairments.

Many authors (Chok et al., 1999; Jackson & Brown, 1983; Saal, 1996) cite a study by Cady et al. (1979). This prospective study (Cady et al., 1979) of firefighters showed that the incidence of low back pain was less in firemen who were physically fit. Consequently, the use of fitness exercises have been recommended to avert morbidity from back injuries (Jackson & Brown, 1983). Interventions to address endurance and cardiovascular changes have been recommended for use during the sub-acute or chronic phase of low back pain (DeRosa & Porterfield, 1992). The previously discussed survey by Poitras et al. (2005) of physical therapists has confirmed the use of cardiorespiratory

exercises in the treatment of acute or sub-acute low back pain, especially during the latter two-thirds of the treatment episode.

Researchers in a 1999 study (Chok et al., 1999) examined endurance training for the extensor muscles of the back for individuals with subacute low back pain. The study design included an experimental group and a control group. The study population was similar to the patient example in that duration of symptoms was seven days to seven weeks; ages were between 20 and 55 years; and low back pain was the primary complaint, with or without associated leg pain. Subjects were excluded if the following findings were present: other medical diagnoses; contraindications to exercise therapy; spinal or lower-limb surgery; fractures or structural deformities; involvement in workers' compensation claims; signs of nerve root compromise; or use of medications other than analgesics and nonsteroidal anti-inflammatory drugs. Moffroid, Haugh, Haig, Henry & Pope's study (1993) was cited as the source for the exercise protocol for subjects in the experimental group. Exercises consisted of bilateral shoulder lifts; contralateral arm and leg lifts; bilateral shoulder lifts with hands behind the head; and bilateral shoulder lifts with arms elevated. All exercises were performed in the prone position. Back extensor stretching exercises were performed before and after the endurance exercises, and a warm-up exercise consisting of cycling on an ergometer was performed prior to the endurance exercises. Study findings showed decreased pain and improved function in the experimental group after three weeks. After six weeks, these differences were no longer present between the two groups. The authors concluded, "Endurance exercise is considered to expedite the recovery process for patients with an acute episode of low back pain" (Chok, et al., 1999, p. 1032). The findings from this study could apply to the

current study since the patient conditions and intervention time frame roughly matched the current study.

Postural Exercises

No studies were found that specifically addressed the use of postural exercises for treatment of low back pain. However, improvement of posture has been reported as a treatment goal for patients with low back pain (Kerssens et al., 1999a; Poitras et al., 2005). Posture awareness and control training are described as a component of therapeutic exercises for spinal disorders in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). Although there is a lack of research on postural exercises, the possibility exists that these exercises could be categorized under another name, making it difficult to determine their effectiveness.

Aquatic Exercises

Swimming was recommended by Cyriax (1975) as the "only actively beneficial sport" (p. 512) for disc lesions; however, a swimming program was not specifically included as part of his treatment recommendations. Ambulation exercises in a therapeutic pool were advocated by Nagler and von Estorff (1987) following a period of bed rest. Aquatic programs are described as a component of therapeutic exercises for spinal disorders in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001).

In a 25 year cohort study, 68% of individuals (Harreby et al., 1997) who participated in swimming during their leisure time reported that this sport improved their low back pain. Proposed benefits of aquatic exercises include: the decreased weight

bearing afforded by the buoyancy of the water, the frictional resistance of the water and the fluid pressure exerted by the water (Ariyoshi et al., 1999; Konlian, 1999).

Only two studies were found that discussed the use of aquatic exercises in the treatment of low back pain. One study (Ariyoshi et al., 1999) from Japan surveyed patients regarding their perceptions of their physical and psychological condition after participating in an aquatics program. Patients were seen after a period of treatment in the hospital and had varied diagnoses. The exercises were performed outside or inside the swimming pool. The outside-the-pool exercises consisted of abdominal and gluteal muscle strengthening and static stretching of the back and hip muscles. The aquatic exercises consisted of static stretches of hamstrings and calf muscles, back and sideways walking, front jogging, front, leg raises, bobbing and jumping and swimming crawl or back stroke. The entire session took approximately 90 minutes, performed one to three times a week for six months or more. Results from the survey showed that the mean value of the physical scores improved significantly following participation in the program. When subjects were subdivided according to frequency of participation, subjects who participated two or more times a week had significant improvement, while participation one time a week did not show a significant change.

The second study (Konlian, 1999) was a descriptive article designed to increase knowledge and understanding of aquatic therapy. Many benefits were proposed for the use of the aquatic medium for spinal patients, such as allowing earlier intervention following injury or surgery, with little to no risk of re-injury. Clinical observations showed that it shortened the rehabilitation course and accelerated the healing process (Konlian, 1999). Studies were cited in which aquatic therapy was able to provide

clinically important benefits for populations other than low back pain. The available research to support the use of aquatic therapy was felt to be minimal, and more scientific research was felt needed (Konlian, 1999).

Although there was little research to support aquatic therapy for low back pain, aquatic therapy could be considered a possible option due to the proposed benefits of the aquatic medium and the findings of the study by Ariyoshi et al.(1999). However, as noted by Ariyoshi et al. (1999), aquatic exercises have the disadvantage that a pool is needed for their use.

Range of Motion Exercises

Historically, stretching exercises for the hip flexors and back extensors were recommended for treatment of a herniated nucleus pulposis following a period of bed rest (Nagler & von Estorff, 1987). Stretching exercises were used in a study (Saal & Saal, 1989) that investigated the effect of dynamic muscular stabilization exercise programs for the nonoperative management of herniated nucleus pulposis and radiculopathy. In addition to the stabilization exercises, the program included stretching exercises for the following muscles: hamstring, quadriceps, iliopsoas, gastrocsoleus, hip rotator and iliotibial band muscles. Since the program was multi-purpose in nature, the effectiveness of the stretching exercises alone could not be determined from this study. Range of motion exercises are described as a component of therapeutic exercises for spinal disorders in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001).

A couple of studies in which physical therapists were surveyed have described the use of stretching or flexibility exercises for patients with acute low back pain (Byrne et

al., in press; Poitras et al., 2005). In a general study of patient education for low back pain, Kerssens et al. (1999a) found that physical therapists in the Netherlands use exercises for mobility of the lumbar spine and to stretch the iliopsoas and hamstring muscles for patients with low back pain.

No studies were identified that specifically examined the effectiveness of stretching exercises in acute low back pain, although one study (Descarreaux et al., 2002) did find stretching exercises beneficial when combined with strengthening exercises to address individual force and extensibility deficits.

Strengthening Exercises

Strengthening exercises for the treatment of acute low back pain has long been a popular concept. Strength training was described as a component of therapeutic exercises for spinal disorders in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). A 1998 study (Seferlis et al., 1998) performed in Sweden evaluated this approach. Patients who had acute low back pain were assigned to a manual therapy program, an intensive training program or a general practitioner program. Inclusion criteria included low back pain with or without sciatica, a sick leave period for low back pain less than two weeks before entering the study, ages 18 to 64 and employment. Exclusion criteria included previous low back condition requiring intervention within one month before study entry, previous spine trauma or surgery, other conditions of the spine, major medical disease, drug/alcohol addiction, psychiatric disorder or unsatisfactory knowledge of the Swedish language. Attempts to classify patients into subgroups were not performed prior to assigning exercises. Patients in the manual therapy program received manual therapy in conjunction with other treatments,

including information, stretching and controlled training of co-ordination and stability in the spine and extremity joints. Patients in the intensive training program received information, exercises to decrease muscle fatigue and exercises to increase muscle strength and coordination. Study results revealed no differences between the groups for measures of impairment, pain, functional disability or socioeconomic disability.

A strengthening exercise program was used in a study (Klaber Moffett et al., 1999) that incorporated a cognitive-behavioral component for treatment of patients with mechanical low back pain of four weeks to six months duration. This study did not directly apply to the patient example since the duration of low back pain was different.

One rationale for the use of physical training programs (that may or may not include an aerobic exercise component) was to enhance neuromuscular efficiency for purposes of improving muscular shock absorption abilities and teaching the patient patterns of movement to minimize stress (DeRosa & Porterfield, 1992). The importance of adequate muscle strength, endurance, motor control and proprioception have been emphasized (Pope et al., 2002).

In the previously discussed study by Poitras et al. (2005), over 75% of physical therapists indicated they would provide education on a strengthening exercise program for treatment of a patient with acute or sub-acute work-related low back pain (with or without radiating pain below the knee). The frequency of use for strengthening exercises was found to change across the episode of care. There was an increased frequency of use of these exercises during the latter part of the episode of care as compared to the initial sessions of the episode of care. The opposite relationship was seen for the use of the McKenzie approach or postural education.

Graded Exercise Program

Behavioral methods of treatment were assessed in a 1986 study (Fordyce, Brockway, Bergaman & Spengler, 1986). Prior to this report, this method had only been used for patients with chronic pain, while this study was for patients with recent-onset pain. Participants had low back pain that began within the past seven to ten days. They were randomly assigned to the A or B group. In group A, analgesics were to be taken on an as-needed basis. If exercises were used, participants were advised to "...let pain be your guide" (p. 129). Any restrictions on activity limits ended when pain had subsided. In group B, analgesics were taken at fixed time intervals. If exercises were used, they were initiated at a specific time point, had a preset number of repetitions and were incremented on a physician-prescribed schedule. Any activity restrictions ended when a physician-specified time interval had elapsed. At the nine to twelve month follow-up period, subjects in group A were more "sick." The designation "sick" was based on results from the following: health care utilization, claimed impairment and pain drawings. Impairments for group A significantly increased from preonset to follow-up, while impairments for group B decreased at follow-up back to preonset levels. Measures of activity level were not significantly different for the two groups. This study supported the effective use of behavioral management methods.

Spine Stabilization and Core Strengthening/Stabilization

Another type of strengthening exercise approach for the treatment of low back pain is spine stabilization or core strengthening. Core strengthening has been described as the "...muscular control required around the lumbar spine to maintain functional stability" (Akuthota & Nadler, 2004, p. S86). Multiple terms or titles exist to describe

these strengthening exercise approaches, including lumbar stabilization, dynamic stabilization, motor control training, neutral spine control, muscular fusion and trunk stabilization (Akuthota & Nadler, 2004). Muscle fusion has been described as the "use of the musculature to brace the spine and protect the motion segments against repetitive microtrauma and excessively high single-occurrence loads" (Saal, 1992, p. 35). Postural stabilization activities are described as a component of therapeutic exercises for spinal disorders in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001).

The muscles used in trunk stabilization have been categorized into two groups: the global stabilization system and the local stabilization system (Bergmark, 1989). For purposes of this study, exercise approaches that use a generalized or global muscle training approach will be differentiated from those that use a specific, or local, muscle training approach. The generalized approach will be called "spine stabilization," while the localized approach will be called "core stabilization." Recent research studies have emphasized the role of the local muscles in low back pain (Hides, Jull & Richardson, 2001; Hides, Richardson & Jull, 1996; Hodges & Richardson, 1996), suggesting the use of exercise regimens that focus on the local musculature.

Core stabilization (local stabilization system). Hides et al. (1996) found that multifidus muscle (a deep muscle of the spine) recovery is not automatic after painful symptoms have resolved in individuals with a first-time episode of low back pain. Patients in this study were 18 to 45 years old, had unilateral, mechanical low back pain with or without pain radiation into the lower limb and had right-left asymmetry of multifidus cross-sectional area. Forty-one patients were randomly assigned to either the

control group (medical management) or treatment group (medical management and specific exercise therapy). Medical management consisted of advice on bedrest (one to three days), absence from work and prescription of medication. Exercise therapy involved facilitating an active, isometric contraction of the multifidus muscle in co-contraction with the deep abdominal muscles while in the standing position (with neutral spine position). After four weeks, both groups had good pain recovery (although four patients from the control group did not achieve pain-free status after four weeks) and decreases in level of disability. Range of motion increased for both groups. Ultrasound imaging revealed more rapid multifidus muscle recovery among the patients in the treatment group. For both groups, pain was correlated with disability. For the control group, pain and disability were not correlated with muscle recovery. The authors state the most important finding from this study was that the multifidus muscle does not spontaneously recover when pain symptoms have resolved. Although patients appeared to have recovered, changes observed in the muscle system at intake persisted in the group under medical management. The authors suggested multifidus muscle dysfunction could be related to outcome and recurrence of low back pain symptoms in patients with acute low back pain.

A second study was performed by the same researchers in 2001 (Hides et al., 2001). This second study reported the follow-ups of the patients from the first study at one year and three years after treatment. Study findings were as follows: in the year after the initial episode, patients in the control group were 12.4 times more likely to experience recurrences than patients in the treatment group. For years two to three, these differences persisted to a lesser extent, but remained significant. The investigators concluded that

specific exercise therapy combined with medical management and resumption of normal activity resulted in fewer recurrences of first-episode acute low back pain than treatment with only medical management and resumption of normal activity. This study supported the use of specific exercises targeting the multifidus and deep abdominal muscles in patients with acute low back pain.

A survey (Byrne et al., in press) of physical therapists in Ireland found that specific spinal stabilization exercises were the first preference of 38.9% of physical therapists for management of acute low back pain.

Spine stabilization. The use of spine stabilization exercises in the treatment of low back pain has a strong theoretical underpinning. In 1965, the use of a muscle-bracing technique using intra-abdominal pressure to stabilize the lumbar spine was discussed (Kennedy, 1965). More recent analysis proposed that passive stiffness, active stiffness and neural control are needed to support the lumbar spine during daily movements (Panjabi, 1992a; Panjabi, 1992b). Exercises to enhance the function of the support mechanisms have been suggested (Akuthota & Nadler, 2004; Barr, Griggs & Cadby, 2005; Kennedy, 1965).

A stabilization program for dynamic control of the lumbar spine was evaluated in a 1989 retrospective cohort study (Saal & Saal, 1989) for patients with diagnoses of herniated lumbar intervertebral discs. The stabilization training program was initiated after the pain control phase of the program and included exercise training for the following: soft tissue flexibility, joint mobility, stabilization program (neutral spine), abdominal program, gym program and aerobic program. Weight training programs using free weights, pulleys and weight training equipment were used. The key to the

stabilization program was abdominal muscle strengthening. Study results showed the majority of patients had a good or excellent outcome. However, since patients' average duration of symptoms was 4.6 months, the time frame of this study did not match the current study. Also, the spine stabilization program was not the only intervention that was used, and there were other patient conditions that did not match the patient conditions in the current study.

Researchers in a study (Bakhtiary, Safavi-Farokhi Ziaeddin & Rezasoltani, 2005) conducted in Iran assessed the use of lumbar stabilizing exercises in patients with lumbar disc herniations. Patients had clinically diagnosed herniated lumber disc lesions confirmed by MRI or CT scan. Patients' pain duration was greater than two months. There were two groups in the study: group A and group B. Group A performed the stabilization exercise program for four weeks upon entry into the study, followed by a four week no-exercise period. Group B performed the opposite. Study findings were that there was reduced pain, improved mobility and improved activities of daily living performance in both groups following the exercise period. Again, this study had limited application to the current study since the time frames do not match.

As noted previously, some stabilization exercises focus on specific muscle groups, while others are more global in nature. A study performed in 2004 (Kavcic, Grenier & McGill) attempted to determine the stabilizing role of individual torso muscles during rehabilitation exercises. Electromyography was performed along with measurement of three-dimensional lumbar motion and external forces, while ten male study participants performed eight stabilization exercises. During the exercises, the subjects isometrically contracted their abdominal muscles. The analysis of the data

involved the use of three complex models (an eight-link segment model to calculate reaction forces and moments acting at the lumbar intervertebral joints; a "lumbar spine model;" and a "distribution-moment model") to calculate a stability index (p. 1258). The authors concluded their results showed that many muscles are involved in stabilizing the spine as loads are applied. They questioned the use of exercises that focus on only one or a few muscles. This research supports the use of a generalized, more global muscle training approach for spine stabilization, although the authors recognized the study conclusions were limited to the exercises that were tested.

A recent randomized controlled trial (Koumantakis, Watson & Oldham, 2005) supported the use of a general trunk exercise program over that of a general trunk exercise program that included the addition of specific spinal stabilization exercises. This study sought to examine the usefulness of the addition of specific exercises to a general back and abdominal exercise program for patients with subacute and chronic nonspecific back pain. Since this patient population (recurrent low back pain with current episode six weeks) did not match the patient conditions in the current study, this study was not considered further.

Spinal stabilization exercise programs have been used for the treatment of lumbar disc lesions (Bakhtiary et al., 2005; Kennedy, 1965; Saal & Saal, 1989). Cyriax (1975) supported the use of physical therapy to instruct patients to use their semispinalis muscles to stabilize the spine following disc injuries. Muscle groups that are commonly strengthened include the lumbar paraspinals (Kennedy, 1965; Saal & Saal, 1989), abdominal muscles (Kennedy, 1965; Saal & Saal, 1989), quadratus lumborum, hip girdle musculature, diaphragm and pelvic floor musculature (Kennedy, 1965). Individual

exercises may include the curl-up, bilateral straight leg raise, side bridge, the "bird dog" and gymnastic ball exercises (Saal & Saal, 1989).

Most sources (Bakhtiary et al., 2005; Koumantakis et al., 2005; Saal & Saal, 1989) have described the use of stabilization exercises during the subacute or chronic phase of healing. Conversely, the relief of pain is the main goal of acute care (Saal & Saal, 1989). The authors (Fritz & Hicks, 2001) of a chapter in the textbook "Exercise Prescription and the Back" (Liemohn, 2001) also discussed the use of lumbar stabilization exercises during the latter part of the rehabilitation program. The stabilization exercises were used after pain had been controlled through the use of exercises to help centralize symptoms.

Despite the lack of research on the use of stabilization exercise programs during the acute phase of healing from lumbar disc herniations, this approach could still be considered for the patient example. The reasons for this will be described. The duration of the acute phase of healing could vary among individuals with lumbar disc herniation, and symptoms could decrease after a week or two (Benoist, 2002). Once symptoms have centralized and the problem is considered to be sub-acute, stabilization exercises for specific muscles could be considered appropriate (Fritz & Hicks, 2001). Stabilization exercises have been described as being on a continuum progressing from easier to harder exercises (Saal & Saal, 1989). Basic stabilization exercise training was included in the pain control phase of the stabilization program described by Saal and Saal (1989) for treatment of herniated lumbar intervertebral discs. This, then, would make the use of basic stabilization exercises possible during an earlier phase of recovery.

Exercises to Decrease Pain

DeRosa and Porterfield (1992) discussed the application of controlled, nondestructive stresses into the low back region to promote movement. The authors suggested that the passive extension press-up maneuver is an example of an active mobilization tool that can be used to help alter a patient's pain pattern. These nondestructive forces were to be used with the acutely injured patient following the use of modalities or medications to reduce pain (DeRosa & Porterfield, 1992). Delitto et al. (1995) also described the use of exercises during the first stage (Stage I) of treatment, in which the primary focus was pain modulation.

Neural Tissue Gliding Exercises

A physiotherapist in Australia proposed mobilization of the nervous system in his 1991 textbook (Butler) as a treatment for adverse tension in the nervous system. The patient conditions in the current study (straight leg raise test and passive neck flexion test) were suggestive of adverse tension in the nervous system. Theoretically, this could have resulted from injury to the nerve roots of the lumbar spine as a result of a disc injury. For disc injuries, Butler suggested mobilization of knee extension while the hip is maintained in flexion. Patients could perform a similar technique independently as a form of self-mobilization.

Saal (1992), in an article on the new back school prescription and stabilization training, discussed the importance of flexible muscles and neural elements. Flexibility was believed important for appropriate pelvic positioning to maintain postural control of the lumber spine.

Physical therapists have used neural mobilization techniques for treatment of patients with low back pain. The previously discussed study by Poitras et al. (2005) surveyed physical therapists working in private clinics in Quebec, Canada, about their management of work-related low back pain. Therapists were asked to complete a clinical management questionnaire to describe their management of the first two eligible workers who were missing work due to acute or sub-acute low back pain (one with and one without presence of radiating pain below the knee). Of the physical therapists who participated in the study, 8.9% reported that they used neural mobilization for the treatment of a patient without radiating pain below the knee (Poitras et al., 2005).

The evidence for the effectiveness of neural mobilization is minimal. In the only study (George, 2002) found, a slump stretching technique was used for treatment of patients classified for stage two treatment in the treatment-based classification system proposed by Delitto et al. (1995). The patients in this case series (George, 2002) were unmatched to the current study, so this study was not considered further for the literature review.

Patient Management Approach and Selection of Therapeutic Exercises

For the literature reviewed to this point, findings were mixed regarding the effectiveness of exercises in the treatment of low back pain. The findings were complicated further by the various management approaches that were used. Some studies investigated the effects of a standardized exercise program on a heterogenous (nonspecific) acute low back pain population. Other studies investigated the effects of an individualized exercise program for specific subgroups among the low back pain population. Since the findings were equivocal, further information was sought from the

literature. Several recent studies assessed the relationship between management approach and outcomes.

In one study (Fritz et al., 2003), researchers compared outcomes for classification-based physical therapy with that of a standardized program based on clinical practice guidelines. Study findings suggested there were improved health outcomes when treatment decisions were based on low back pain subgroup classification. In another study (Brennan et al., 2006), researchers compared outcomes of patients receiving matched or unmatched treatments according to their subgroup classification. Study conclusions were that outcomes could be improved when subgrouping was used to direct treatment decisions. Finally, in the previously mentioned study by Long et al. (2004), the investigators compared the effectiveness of matched exercises, non-matched exercises and a multi-directional exercise program on outcomes for patients who exhibited a directional preference. The group that used exercises concordant with their directional preference had significantly improved outcomes compared with the other two groups.

Although these studies supported an individualized approach to direct treatment decisions, no studies were found that specifically compared the use of patient-specific directional preference exercises for a derangement syndrome versus a non-exercise control group. Thus, the use of exercises in the acute phase of a derangement syndrome remains open to opinion.

Back Schools and Other Interventions

Additional studies were found in which more than one intervention was used, making it difficult to categorize the information under the topics listed thus far. "Back Schools" comprised one such area because back schools typically consist of patient

education in combination with training in body mechanics, posture and exercise. Other studies investigated the combined effect of more than one intervention. All of these studies were reviewed to determine their applicability to the current study. They are briefly described below.

Back Schools

Back Schools are programs that may be used for patient education during the rehabilitation of low back injuries. The term "back school" has been defined as follows: "The back school is a form of group education on back care. The natural history of back pain, anatomy and physiology of the back, body mechanics, ergonomics, and exercises for the back, as well as some psychological aspects of back pain are subjects included in almost all modern back schools" (Klingenstierna, 1991, p. 155).

Several review studies have been conducted on the use of back schools for management of low back pain. A review of back schools by Klingenstierna (1991) concluded that there was no convincing evidence that back schools are useful for the management of low back pain. As part of this review, six studies of back schools for acute low back pain were reviewed. None of the six studies showed that participation in a back school produced any long-term effects on pain, function or number/duration of recurrences. Also, many of the studies did not define the treatment content well, making a review difficult.

These findings were echoed in a later review of randomized controlled trials in industrial low back pain (Scheer, Radack & O'Brien, 1995). After identifying more than 4,000 low back pain citations, this 1995 study reviewed ten articles on interventions for acute low back pain. In the words of the authors, "there is not incontrovertible published

evidence that back school is more efficacious than placebo for acute low back pain" (p. 970).

A meta-analysis (Di Fabio, 1995) of comprehensive rehabilitation programs and back schools was published in 1995. The analysis differentiated results based on whether a back school was the primary intervention or if it was part of a comprehensive rehabilitation program. Comprehensive rehabilitation programs were interventions that contained a back school as well as a work-site visit, operant conditioning, cognitive-behavioral group therapy or an intensive physical training regimen as an adjunct to a traditional back exercise program. The results of the meta-analysis revealed that the outcomes for back schools that were not part of a comprehensive rehabilitation program were no better than outcomes for control groups.

A more recent review (van Tulder et al., 2006) was performed in 2006. This evidence-based review assessed non-invasive treatment modalities for their effect on back pain. Back schools were one of the interventions they assessed for acute low back pain. For back school versus a placebo intervention, one study was reviewed. Results showed the back school group had better short-term recovery and return to work than the placebo group. For back school versus other interventions, four studies were reviewed. These studies showed conflicting evidence on the effectiveness of back schools.

Other Interventions

As noted previously, some studies investigated the combined effect of more than one intervention (Wand et al., 2004; Waterworth & Hunter, 1985; Wright, Lloyd-Davies, Williams, Ellis & Strike, 2005). These studies were reviewed to determine their applicability to the current study. Since multiple interventions were used within the same

treatment group, it was not possible to determine the effectiveness of each intervention on its own.

Summary

The major drawback to these studies was that the components of the physical therapy intervention were not assessed on their own merits. Since the current study design deals with individual topics, comparisons would be difficult. Consequently, studies on back schools or multiple interventions were felt to have limited application to the current study.

Methods of Instruction

This section discusses methods of instruction for patient education. Attempts were made to keep this information relevant to physical therapy. There was not a great deal of research to draw upon; however, several references were found that assessed methods of instruction in physical therapy. Some were general in nature, while others dealt with conditions other than low back pain. These articles were included since no articles were found that were specific to low back pain. Outside of the physical therapy literature, a number of studies were found. Some of these studies have already been discussed; however, others had not been included previously because the patient population was unmatched to the current study. These studies are now included in this section, since they were considered relevant to methods of instruction.

The following section was organized according to the literature that was available. The first section discusses the findings from the physical therapy literature. The next section describes the use of educational booklets/pamphlets/leaflets for patient education.

The next section discusses methods specific to the instruction of therapeutic exercises, while the final section summarizes the literature review on methods of instruction.

Physical Therapy Literature

Several studies were found that reported upon the teaching methods used in physical therapy practice. These studies are discussed in the following paragraphs.

In a study previously described, Chase et al. (1993) conducted a survey of a random sample of American Physical Therapy Association members. Three hundred surveys were distributed nationwide with a 72% response rate. Of the 215 returned surveys, 200 were eligible for analysis. Results showed that the following methods or tools of patient education were used nearly always/most of the time: verbal discussion (99%); demonstration (97.5%); patient-specific instruction sheets with sketches (79.9%); charts of skeleton, muscles, nerves and so on (36.2%); three-dimensional examples of joints, skeleton and so on (26.1%); pre-published booklets/pamphlets (21.2%); textbooks (7.5%); and videotapes or slides (7.5%).

The following study took place in Finland and was published in 1997 (Laitakari, Miilunpalo & Vuori). This study sought to determine the process and methods of health counseling by primary health care personnel (including physical therapists). Physical therapists were one of the professional groups in Finland targeted with national recommendations that health education be integrated into daily contacts with patients. The health education was to cover lifestyle topics as well as treatment instructions. One of the study's questions dealt with how frequently respondents used common health education methods. Study results showed that physical therapists used a greater variety of educational methods than physicians or nurses. The majority of physical therapists

used brief advice, discussion and skills training on a daily basis. On a weekly basis, the following were used: more detailed information and handouts, discussion of the handouts, encouragement of independent thinking/problem solving, visual examples and demonstration, and group counseling. Audiovisual presentations were rarely used, as was devising a personal change program. The Finland study showed that physical therapists use a variety of methods for patient education, with the most frequent being brief advice, discussion and skills training.

For the management of sub-acute low back pain, Nordin et al. (2002) recommended information be communicated using several different methods, such as verbal communication, handouts, brochures, videotape, internet site, *et cetera*. This advice correlated well with the findings of the study by Laitakari et al. (1997) (just discussed), in which physical therapists used a variety of instructional methods.

Educational Booklets/Pamphlets/Leaflets

Numerous studies have reviewed the use of educational pamphlets for low back pain. One of the earliest of these was a study published in 1989 (Roland & Dixon). This study was conducted in England and assessed the use of an educational booklet for patients with acute or chronic low back pain. The booklet contained information on anatomy/biomechanics, advice on management of acute low back pain, prevention, exercises and suggestioins on when to seek medical advice. Patients were randomized into two groups at the time of their initial consultation with the physician. The intervention group received the booklet, and the other group served as the control. There were no other constraints on the physician's management of the back problem. The study results showed that the group that received the booklet consulted the physician less often

than the control group. This decrease in consultation rate occurred during the year following the trial onset (with the exception of the first two weeks of the trial). The study also used an outcome measure to assess patients' knowledge of back pain. Patients who received the booklet had higher scores on the knowledge questionnaire than patients in the control group. For both groups, scores on the knowledge questionnaire were lower for patients aged less than 20 and more than 60. Lower scores were also seen for patients who left full time education before age 20. This study had implications for the current study because physical therapists could choose to use educational booklets for their patients. Roland and Dixon's study supported the use of educational booklets preferentially for individuals between the ages of 20 and 60 and for those who had continued with full time education until age 20.

The next two studies were described previously in the sections on the "Current Condition and Risk Factors for Its Development," and "Information on the Self-Limiting Nature of Low Back Pain and Importance of Resuming Normal Activities." The first study (Cherkin et al., 1996) was performed at a Health Maintenance Organization in Washington state. This study compared three treatment interventions for patients with low back pain. The treatments consisted of: 1) usual care, 2) an educational booklet and 3) a 15 minute educational session with a nurse that included the booklet and a follow-up telephone call. Follow-ups were performed at one, three, seven and 52 weeks after the intervention. No differences were seen among the three groups for worry, symptoms, functional status or health care use at any of the follow-ups. However, the nurse intervention resulted in higher levels of patient satisfaction than usual care. The nurse intervention group and booklet group had higher perceived knowledge at one week, and

this effect persisted for the nurse intervention group at weeks three and seven. Self-reported exercise participation was also higher in the nurse intervention group, but this effect, along with perceived knowledge, was no longer significant after seven weeks. The authors concluded the intervention succeeded in changing how patients thought about their problem, but did not change how they felt about their problem. Since there were limited benefits associated with the interventions, the authors concluded there was little justification for implementing this type of nurse education in primary care. This study offered support for the use of an educational booklet or nurse intervention when the goal is to improve levels of knowledge, but not for changes in functional status.

The second study (Burton et al., 1999) sought to test the impact of a new educational booklet on patients' beliefs about back pain. This study was carried out in England and compared a group of patients who were given a traditional booklet with a group who were given a novel educational booklet, *The Back Book*. The content of the education in each booklet was described previously in the section, "Information on the Self-Limiting Nature of Low Back Pain and the Importance of Resuming Normal Activities." Patients who received the novel educational booklet had statistically significant improvements in beliefs about activity and about the inevitable consequences of back trouble. Levels of disability and pain improved over time, but were not significantly different between the two groups. Patients who received the novel booklet and had a high baseline of fear-avoidance based beliefs were more likely to have a clinically important improvement in beliefs, followed by a clinically important improvement in disability. The authors reported that the novel booklet was completely different from other booklets of this type. The novel booklet was especially designed to

focus on patient's beliefs about back pain. This study demonstrated that a booklet's educational content is important for changing patients' beliefs and that the simple provision of a booklet was effective in achieving this. This study supported the use of an educational booklet when the goal is to change patients' beliefs and improve clinical outcomes for selected patients.

An educational pamphlet based on similar concepts as Burton et al.'s *The Back Book* (1999) was tested in Vermont for workers with occupational injuries (Hazard et al., 2000). This study was explained in more detail in the section on "The Self-Limiting Nature of Low Back Pain and the Importance of Resuming Normal Activities." Briefly, there were two groups of injured workers. One group was mailed the educational pamphlet, while the other group did not receive a pamphlet. Study outcomes showed the pamphlet had no effect on pain severity or reduction, health care visits or work absence. This study did not support the use of a pamphlet when the goal is to reduce pain, number of health care visits or duration of work absence. This study's findings for number of health care visits are in contrast to those of Roland and Dixon (1989). One reason this may have occurred was proposed by Roland and Dixon: written material given to a patient by his or her own physician may carry more weight than unsolicited material sent by mail. Another reason for the lack of success of the pamphlet was proposed by Hazard et al. (2000): "People with back pain may need more specific and individualized information than can be delivered in any generic curriculum" (p. 1422).

Researchers in a 2001 study (Little et al., 2001) sought to assess the effect of an educational leaflet, the *Back Home* leaflet (Chapman et al., 1997), in patients with acute and chronic low back pain. The main trial site was a deprived urban area in England.

The *Back Home* leaflet was developed by seeking input from patients, physical therapists and physicians on the desired components of the information. The leaflet contained information on the anatomy and the causes of back pain and the limited role of radiographs. There was advice about mattresses and analgesia. Bed rest was to be minimized, while keeping mobile was important. Walking was to be progressed each day. Practical tips for getting in and out of bed, standing, chairs, back supports, self care, driving, bracing for coughing and sneezing and lifting were given. Activities such as walking and swimming were encouraged as easier sports to get back into. The link between the level of physical fitness and back pain was discussed. The leaflet also included advice on the use of ice and heat and encouraged an active self-management approach to pain, encouraging patients to identify positions/movements that are painful, as well as those that relieve pain. Examples of positions/movements were given. Sources of further information and helpful addresses were provided. There were four groups in this study: (a) booklet, (b) no booklet, (c) physician advice to take exercise and (d) no advice to take exercise. Outcomes for pain and function were assessed by telephone calls at week one and three, and patient questionnaires at week one. The questionnaire also assessed information on patient satisfaction and knowledge. Study results showed that, shortly after consultation with the physician, there were moderate improvements in pain and function for patients who received the booklet or advice on taking exercise. Satisfaction was also increased for these two groups. Since all patients received advice to keep as mobile as possible, to minimize bed rest and to take simple analgesia, these results were seen over and above this advice. The combined use of the booklet and physician advice to exercise had little effect and was felt to be a negative

interaction. The authors' conclusion was that the combination of a detailed information booklet and advice together were not helpful when the amounts or formats of information differ.

The previous studies demonstrated that educational leaflets were able to change beliefs, knowledge and pain/function. Since little was known about how this related to behavior changes, a study (Roberts et al., 2002) performed in England sought to determine an educational leaflet's effect on knowledge, attitude, behavior and function in people with acute low back pain. As in the Little et al. study (2001), the *Back Home* leaflet (Chapman et al., 1997) was used. This study offered further description of the content of this leaflet; there was advice on positioning, including sitting, and manual handling. It offered positive messages regarding the patient's ability to control pain and stated that most people get better within four weeks. There were interactive sections, where patients could list movements or positions that increase or decrease their pain. Suggestions on positions to use to decrease pain were also included. In addition to walking and swimming, activities such as yoga and relaxation were encouraged. The readability of the leaflet was considered appropriate for health education leaflets (Chapman & Langridge, 1997).

The leaflet was tested in a single-blind, randomized trial. Participants were patients with new episodes of acute low back pain (pain was limited to the low back region only) located in the city of Southampton and an adjacent rural region. Inclusion criteria included the ability to read and understand English and back pain severe enough to require at least three days off from work. Patients who had received previous back care instructions or treatments were excluded from the trial. General practitioners in the

control group continued with their usual care and advice for patients, while general practitioners in the experimental group also provided patients with the *Back Home* leaflet. The general practitioner verbally emphasized the importance of following the advice in the leaflet. Participants were followed up at home using a self-report questionnaire. Observable behavior of the participants was also recorded. Study results showed that use of the leaflet resulted in changes in knowledge and behavior in people with acute low back pain. Knowledge changes occurred for sitting posture and in identifying the easiest position for putting on socks or tights. Behavioral changes occurred for sitting with a lumbar lordosis support and maintaining a wide base of support when lifting a light object. In contrast to the study by Little et al. (2001), the leaflet did not affect function. The authors suggested the timing of the outcome measure may have affected this.

The effectiveness of written material for management of low back pain was called into question in a study (Jacob, Zeev & Epstein, 2003) performed in Israel. This study consisted of a survey of the adult inhabitants of a small town that reported low back pain during the last month in a cross-sectional survey. Respondents reported on their perceived effectiveness of various treatment utilizations, including family physician, specialist, drug therapy, physical therapy, hospitalization, alternative medicine, exercise programs, bed rest, written information and surgery. Among these treatment utilizations, written material on low back pain was perceived as one of the least effective, since less than a third of respondents graded it as effective or very effective. However, 73.5% of respondents perceived that written information was at least partially effective. The results from this study should be interpreted with some degree of caution, since a large number of the respondents reported they did not seek medical care for their low back

condition, and only slightly over one third of respondents were referred to physical therapy. Participants who sought medical care had higher mean scores for disability, frequency and bothersomeness of symptoms, pain severity and longer duration of pain (Jacob et al., 2003). In addition, the presence of radiating pain made patients twice as likely to seek medical care than not (Jacob et al., 2003). These factors make the population from this study different from the population who are referred to physical therapy clinics. It is the population that is referred to physical therapy that physical therapists are likely to have in mind when responding to the survey or interview in the current study. This dissimilarity between the patient population seen in physical therapy practice and the patient population in the Jacob et al. study should be taken into account for any comparisons.

Factors that may be important for the quality of patient information leaflets are the level of readability (Chapman & Langridge, 1997) and the layout and design (Dickinson, Raynor & Duman, 2001). Chapman and Langridge (1997), based on a review of the literature, determined the acceptable reading level for health education leaflets is between grades five and nine. Researchers in a small exploratory study (Dickinson et al., 2001) found that the design of a patient information leaflet for Burofen (a made-up brand of ibuprofen) affected consumers' understanding of the information in the leaflet. Dickinson et al. (2001) cite Sless and Wiseman as the source for the leaflet found to be more successful. The design of the more successful leaflet incorporated the following principles: 1) signposting (use of short section headings that are sequenced according to how the task is performed; use of numbering; and use of boxes with an open design), 2) grouping of related items together using bullets and broken paragraphs rather

than solid text and 3) avoiding jargon and long sentences that have more than one message or concept.

Exercise Instruction

A number of authors provided recommendations for methods of exercise instruction. One recommendation was that physical therapy exercise instruction requires careful supervision (Kester, 1968). Further comments were: "It is naïve to think that most patients can be taught a few simple exercises in one or two sessions and then the problem is solved. And certainly it is not effective to give a patient a written list of exercises and merely tell him to go home and do them" (Kester, 1968, p. 400). Klaber Moffett (2002) agreed, stating that exercises need to be carefully taught and demonstrated to patients, followed by the patient practicing the exercise with guidance from the clinician. The purpose of each exercise should be explained, and a written and illustrated guide should be given to the patient to promote better adherence (Klaber Moffett, 2002). A dynamic stabilization program should be taught by an experienced physical therapist or exercise trainer using a one-on-one instructional method (Saal & Saal, 1989). Subsequent training can include instruction in a group (Saal & Saal, 1989). Exercises should be monitored to ensure correct form and technique (Saal & Saal, 1989).

Several studies compared different methods of exercise instruction. Videotape instruction was compared to the use of still-photographs for exercise instruction of healthy subjects (Weeks et al., 2002). Knowledge retention, motivation and confidence were all superior in the video group (Weeks et al., 2002). Researchers in another study (Reo & Mercer, 2004) assessed the effects of live, videotaped or written instruction on learning exercises for the upper extremities. Study results showed that live and

videotaped modeling were more effective than a handout alone for accurately performing the exercises. The investigators of a study published in 2005 (Lysack, Dama, Neufeld, & Andreassi) compared computer-assisted video instruction and routine rehabilitation practice for instruction of home exercises for postoperative patients in an orthopaedic rehabilitation hospital. Upon discharge from the hospital, patients in the control group received verbal and written instructions for the exercise program. Patients in the experimental group received a customized videotape of the exercise program. Study findings were that there were no differences between the two groups for patients' self-reported compliance or satisfaction. The authors concluded that existing rehabilitation practices for therapeutic exercise instruction should not be altered.

Two of the aforementioned studies (Reo & Mercer, 2004; Weeks et al., 2002) supported the use of videotapes/dynamic exampling for instruction of exercises. The study by Lysack et al. (2005) found the opposite to be true. This difference may have been the result of how the videos were used; in the Lysack et al. study, participants were already familiar with the exercises and had been performing them while in the hospital prior to receiving the videotape at discharge. The videotape was intended for continued home performance of the exercises. It is possible patients felt they were already familiar with the exercises and did not feel a need for reviewing the videotape. In contrast, the other studies (Reo & Mercer, 2004; Weeks et al., 2002) used the videos for the initial instruction of the exercises. It may be that videos can be of benefit for learning exercises, but not for recall.

Additionally, Lysack et al. (2005) suggested other reasons for the lack of a statistically significant benefit for the use of video exercise instruction. These reasons

may have been related to the length of the follow-up period, the age of the patients (resulting in the possibility of a lack of familiarity with video technology—the average age of the patients was 61.8 years) and the possible presence of a "ceiling effect" with the study questionnaire. For some of the same reasons, the patient and study conditions in the Lysack et al. study may not apply to the patient conditions in the current study.

For the current study, the use of videos for exercise instruction may be a consideration for the patient example.

Friedrich et al. (1996) compared the effects of a brochure versus therapist teaching on learning therapeutic exercises. They also assessed for changes in impairment status. Participants had neck or back pain, and all patients received one of three different exercise brochures. Patients were randomly assigned to one of two treatment groups. The supervised group received individual instructions from a physical therapist and participated in eight treatment sessions. Patients were to exercise on their own for 20 minutes a day on the days they did not attend the clinic. The brochure group was given a brochure by the physical therapist and advised to exercise for 20 minutes once a day. Study results demonstrated that significantly more patients in the supervised group had improvements in the quality of exercise performance than patients in the brochure group. Measures of muscle status and pain relief also favored the supervised group. This study supported the use of therapist teaching as compared to a brochure for exercise instruction.

The value of practice on the ability to perform lumbar stabilization exercises was investigated in a study published in 1999 (Hagins et al.). Participants were nonimpaired volunteers who were assigned randomly to exercise and non-exercise groups. All subjects had a pretest and post-test for their ability to perform the exercises. The exercise

group was assigned a home exercise program and returned to the clinic once a week for three weeks. During the return visits, subjects were re-tested and, if ready, were given a new home exercise program that represented a progression of the original exercises. The post-test was performed after four weeks. Study results showed that the median level of exercise attainment significantly improved for the exercise group, but not for the non-exercise group. The authors concluded that the exercise program (with re-instruction and testing once per week) improved the ability of participants to perform progressively more difficult lumbar stabilization exercises. The findings of this study have implications for the current study. Literature findings support the use of these exercises (specific stabilization using transversus abdominus and multifidus muscles) for the patient example. If these exercises are used, an instructional method that includes practice and periodic reappraisal appears necessary to improve performance.

Schneiders, Zusman & Singer (1998) investigated the effect of educational strategy on exercise therapy compliance in acute low back pain patients. Patients had nonspecific low back pain and were seen in physical therapy clinics in Western Australia. Patients' ages were between 17 and 68 years, and their classification in the Quebec Task Force on Spinal Disorders included classifications one to three. There were two groups in the study. Both groups received verbal exercise instruction with appropriate guidance until patients could perform each exercise properly. The intervention group received a personalized computer generated written and illustrated print-out of each exercise, while the control group received no printed reinforcement. Study results showed that patients in the intervention group had a significantly higher mean compliance than the control group. The study also found that there was a significant difference among the two groups

for patients who expected exercises to be prescribed for the treatment of their low back pain. More patients in the intervention group expected exercises to be prescribed than patients in the control group. Patients who expected exercises to be prescribed also had a significantly higher compliance rate. The authors reported subsequent analysis revealed there was no statistically significant difference in compliance between those who expected exercise in either the control group or in the intervention group. Also, since patients were asked about exercise expectations retrospectively, the relevance of this expectation to exercise compliance may have lacked specific validity (Schneiders, 1998). This study supported the addition of written and illustrated exercise instruction to verbal instructions alone for purposes of improving exercise compliance.

Learning Theories and Models

The previous sections discussed the content and methods of patient education as related to the patient example. This section will review some of the theories and models for learning and how they relate to educational content and methods.

Behaviorism

Behaviorism is one of the major theories of learning (Ornstein & Hunkins, 1998), and was described by James Watson as the study of human behaviors or actions (Norton & Wiburg, 1998). This theory relates learning to a stimulus-response relationship (Avers & Gardner, 2000). Researchers in this area have included Thorndike and Skinner, among others (Ornstein & Hunkins, 1998). Thorndike discussed three laws of learning: 1) the *Law of Readiness*, 2) the *Law of Exercise* and 3) the *Law of Effect* (Ornstein & Hunkins, 1998) (Avers & Gardner, 2000). The *Law of Readiness* states that a connection is needed for conduction; if a learner is not ready for the connection, then learning is inhibited. The

Law of Exercise and *Law of Effect* state that repetition is important to strengthening a connection when reinforcement is also present. In management of low back pain, the use of a graded exercise program borrows from the concepts of behaviorism. The following paragraphs discuss behavioral methods of treatment as described for the treatment of chronic pain (Fordyce et al., 1973).

Fordyce et al. (1973) cited Skinner's work in operant conditioning as the basis for this treatment method. Patients' pain behaviors were viewed as operants, and operant conditioning for treatment of low back disorders was initially suggested for use with chronic pain. The basic elements of operant conditioning included the use of positive reinforcements, negative reinforcements or no reinforcements (neither positive nor negative) to modify behaviors. The pain behaviors that normally occured in response to injury could be reinforced during the early stages of the problem, leading to a possible situation in which pain behaviors continued to be present and reinforced, even though the original noxious stimulus was no longer present. A further supposition was that "well behaviors," such as work, exercises, or active leisure pursuits, were no longer systematically reinforced. The consequences could be the continuation of a learned pain behavior response even when there was no longer an active pathogenic factor. For some patients, these pain responses (since they were learned behaviors) might be amenable to treatment using a learning-based treatment approach. The treatment was not aimed at modifying tissue or emotional pathology, but attempted to modify pain responses or behavior. As Fordyce et al. (1973) stated, if pain responses or behaviors could be altered using this approach, the "validity of the disease example of pain as the sole explanatory system must be questioned" (p. 400).

Using this approach, pain behaviors were to be reduced or eliminated. Pain behaviors were described as follows: taking medication, moaning, gasping, verbalizing the presence of pain, communicating pain via gesture or facial expression, using a guarded walking pattern and curtailing activities in response to pain. Well behaviors were to be increased and included: prescribed exercises in physical therapy, physically demanding tasks in occupational therapy, walking laps and time in a work assignment. The patient's spouse was included in the treatment program to help modify the spouse's response to pain and well behavior.

Elements of the program included taking pain medication on a time-contingent basis instead of a pain-contingent basis. People in the presence of the patient were to be socially unresponsive to pain behaviors. The use of rest periods was not to be contingent on pain, but was to be a positive reinforcer for activity. Once tolerance levels were established, quotas were set. Completion of preset quotas was accompanied by attention from the therapist. If patients were unable to meet their quotas, the therapist reacted in a socially unresponsive way.

The relationship between this approach and the current study will be discussed. As described previously, this program was used in a control-group comparison study for patients with acute back pain (Fordyce et al., 1986). Long-term study results (at nine to twelve months) showed that patients receiving this management approach were less "sick" (sick/well scores were defined using the outcomes from vocational status measures, health-care utilization, claimed impairment and pain drawings) than patients in the control (traditional management) group. This study supported the use of a behavioral approach in the treatment of acute back pain. Since the patient example's low back

condition is only one week old, this treatment approach may be considered appropriate, based on the findings of this study.

Cognitive-Information Processing Theories

Another major theory of learning consists of the cognitive-information processing theories, in which the application of knowledge is considered important, and the learner is viewed in his/her relationship to the entire environment (Ornstein & Hunkins, 1998). With a cognitive orientation, the emphasis is on promoting mental processing for learning (Avers & Gardner, 2000). Key elements of the cognitive information processing theories include the student's developmental stages, multiple forms of intelligence, problem solving, critical thinking and creativity (Ornstein & Hunkins, 1998). Jerome Bruner, a cognitive theorist, discussed learning in terms of three related processes: 1) acquisition, 2) transformation 3) and evaluation (Ornstein & Hunkins, 1998). These concepts are important in terms of designing a curriculum to be well organized and sequenced (Avers & Gardner, 2000). Also important are strategies to help motivate students and for instructors to provide feedback (Avers & Gardner, 2000). In a chapter on physical therapy patient education for older adults, Avers and Gardner (2000) discussed the application of cognitive theories by designing a learning activity to start with simple tasks and then progressing to more complex skills.

Cognitive-Behavioral Approaches to Therapy

There are treatment approaches that combine elements of both theories discussed to this point (behaviorism and cognitive-information processing theories). These treatment approaches have been called cognitive-behavioral approaches and they have been used in an effort to help avoid the development of long-term disability (Linton &

Andersson, 2000). Another purpose has been to encourage patients to take a self-management approach to their back pain (Klaber Moffett, 2002). The cognitive-behavioral method was felt to be useful for helping patients change their behavior and lifestyle (Klaber Moffett, 2002). A research study published in 1999 (Klaber Moffett et al.) described the use of a strengthening and stretching exercise program with a cognitive-behavioral component for treatment of patients with mechanical low back pain of four weeks to six months duration. Patients were discouraged from following the adage, "Let pain be your guide," but were asked to focus on self-reliance and on improving their individual record. While the last study did not directly apply to the patient example (duration of low back pain was different), it did illustrate the application of the cognitive-behavioral approach in physical therapy.

The following discussion is from an article on the "fear-avoidance example" of exaggerated pain perceptions (Vlaeyen & Linton, 2000). The "fear-avoidance" example has been suggested as a central mechanism in the development of chronic back pain problems. This example includes behavioral, physiological and cognitive aspects of learning. Aspects of the fear-avoidance concept can be seen using the following examples: "a back pain patient may develop a fear of lifting after experiencing pain while lifting, or after receiving information from a doctor that lifting can damage nerves in the spinal cord" (Vlaeyen & Linton, 2000, p. 318). The discriminative stimulus then takes on negative connotations that activate muscle reactivity, fear, anxiety, *et cetera*. Cognitive processes are considered important in the pain experience since pain is multidimensional. Two opposing behavioral responses to pain-related fear are possible: confrontation or avoidance. In the avoidance response, pain catastrophizing and the use of avoidance-

behaviors are followed by disability, disuse and depression. In contrast, for the confrontation response, pain is not interpreted as threatening, there is no pain-related fear and confrontation with daily activities is likely. The confrontation response leads to fast recovery, while the avoidance response is self-perpetuating. Suggestions for clinical management of pain-related fear include the use of an early cognitive-behavioral intervention for selected patients at risk for disability. Once a screening process determines that a cognitive-behavioral approach is recommended, education should take place. This education should encourage the patient to view his/her pain as a common condition that can be self-managed. Instructional methods such as lectures and rational arguments are not felt to be effective at addressing cognitive-perceptual factors. The optimal technique is considered to be graded exposure to the feared situations. This technique is similar to the graded activity programs mentioned earlier, but there is a difference; special attention is paid to the personal and distinctive aspects of the pain-related fear stimuli. This permits the individual to correct his/her misconceptions between activities and harm.

This work by Vlaeyen and Linton (2000) discussed the importance of identifying fear-avoidance beliefs in patients with low back pain. Cognitive-behavioral programs have been found clinically effective for patients who have sub-acute or chronic pain (Klaber Moffett et al., 1999). For acute low back pain, use of a fear-avoidance based intervention (education plus graded exercise program) was only found beneficial for patients with elevated fear-avoidance beliefs (George et al., 2003). Thus, for the patient example, the use of a fear-avoidance based intervention would not be recommended. However, the education portion of the intervention is generic in nature and has been

recommended as part of an overall strategy for management of low back pain (DeRosa & Porterfield, 1992; Klaber Moffett, 2002; Nordin et al., 2006). Thus, for the patient example in the current study, instructions regarding the self-limiting nature of low back pain and the importance of resuming normal activities could be indicated. Future studies should help clarify how this information can be tailored for individuals with and without elevated fear-avoidance beliefs.

Phenomenological and Humanistic Theories

A third major category of learning theories consists of phenomenological and humanistic theories (Ornstein & Hunkins, 1998). These theories are concerned with the needs, attitudes and feelings of the learner. (Ornstein & Hunkins, 1998) Abraham Maslow, a phenomenologist, described and categorized human needs in a hierarchy (Ornstein & Hunkins, 1998). The hierarchy demonstrates how human needs, such as survival, safety, love and belonging, must be met before an individual can be interested in acquiring knowledge of the world. At the highest level on the hierarchy are self-actualization needs, in which individuals strive to become the best person they can be and to develop to their fullest potential. Maslow stated the goal of education should be to promote self-actualization, in which learners are happy, at ease with themselves and others and can accomplish and grow. This theory has implications for health care and patient education. Patients who are worried about their health condition may be unable to learn until their fears are addressed. Klaber Moffett (2002) stressed the importance of addressing patients' concerns about their low back condition. She stated, "...this could well be the most important part of the therapeutic encounter" (Klaber Moffett, 2002, p. 206).

Social Learning Theory

Social learning theory was described by Albert Bandura in 1977 (Avers & Gardner, 2000). This type of learning is based on observation and modeling (Ornstein & Hunkins, 1998). According to Bandura, most human behaviors can be learned through observation (Bandura, 1977b). Four component processes are present with this type of learning: 1) attentional processes, 2) retention processes, 3) motor reproduction processes and 4) motivational processes (Bandura, 1977b). Bandura's social learning theory has been cited as a basis for learning when illustrations or videotapes are used for exercise instruction in physical therapy (Weeks et al., 2002).

Another aspect of Bandura's work concerns an individual's sense of *self-efficacy*—the belief that one has the ability and capability to influence events (Bandura, 1977a). A theme running throughout the literature on management of low back pain is advice that "focuses on patients' beliefs and on what they themselves should do about their back pain" (Burton et al., 1999, p. 2489). Patients' perception of their control of their back pain was felt to be a clinically important concept (Roberts et al., 2002). Klaber Moffett (2002) cautioned against treatments that could result in dependency on the practitioner. Thus, much of the current advice for treatment of low back pain focuses on a self-care approach and promoting higher levels of self-efficacy among patients. Self-efficacy may have the potential to result in improved health outcomes (Allegrante et al., 1991). This belief is supported by a study of exercise, self-efficacy and mobility performance in older adults with knee osteoarthritics (Focht et al., 2005). Self-efficacy was found to be a significant predictor of improvement in mobility performance (Focht et al., 2005).

A related concept is *locus of control*, or an individual's perception of how events are controlled or shaped. Persons with an internal locus of control believe they are responsible for their own successes and failures. Persons with an external locus of control believe that external factors play a large role in controlling events. Avers and Gardner (2000) added further information; individuals with an internal locus of control will show steadfastness and resolve, and persons with an external locus of control will be more influenced by external factors such as praise or rewards. The use of an introductory letter prior to physical therapy appointments resulted in higher levels of perceived control among patients receiving outpatient rehabilitation (Johnston, Gilbert, Partridge & Collins, 1992). In a case report (Holmes, Fletcher, Blaschak & Schenck, 1997), researchers discussed an alternative example of orthopaedic physical therapy intervention that included empowering the patient and establishing an internal locus of control. This study concerned a physical therapy outpatient with shoulder dysfunction. The goal of the alternative example of treatment was to improve the patient's compliance with the home program. For developing an internal locus of control, the patient was encouraged to be active in deciding the need for, and timing of, subsequent physical therapy visits. The authors discussed how a limited treatment program with fewer patient contacts within the first weeks was felt important in facilitating home program compliance and empowerment of the patient. These factors could be relevant toward the patient education program in the current study, especially since current recommendations for low back pain treatment centers on a self-management principle.

Adult Learning

Concepts from the field of adult learning had many implications for the current study. One of the individuals who has had major influence in this field is Malcolm Knowles (Avers & Gardner, 2000). Knowles (1984) developed a new approach to learning: the Androgogical Example. *Andragogy* is defined as "the art and science of helping adults learn" (Knowles, 1984, p. 6). The following is a description of concepts from the example. The adult learner is self-directing and enters the learning process with a greater amount of experience than youth. An adult's experiences become the source of self-identity; "So if in an educational situation an adult's experience is ignored, not valued, not made use of, it is not just the experience that is being rejected; it is the person" (Knowles, 1984, p. 11). This makes it very important to use the experience of adult learners as a resource for learning. Another concept is that adults become ready to learn when there is a perceived need. This perception does not have to occur on its own, but can be facilitated. Adult learners enter a learning situation with a problem-centered approach to learning. This view makes it important to organize the curriculum around life situations as compared to subject matter units. The andragogical example states that internal motivators, such as self-esteem, recognition and self-actualization, are more important to the adult learner than external motivators, such as a salary increase. Elements of the teaching process design for androgogy include: setting a climate of collaborativeness and mutual respect and involving learners in developing learning objectives and designing the learning plans. Learners should also be involved in evaluating their learning.

Involving learners in developing learning objectives and designing learning plans is also encouraged from a humanistic viewpoint (Ornstein & Hunkins, 1998). Teachers are encouraged to be sensitive to learners and to see them as individuals with varied needs and abilities (Ornstein & Hunkins, 1998). The American Physical Therapy Association recommends that physical therapists work with their patients in establishing the plan of care (American Physical Therapy Association, 2001). Also, the expectations of patients should be taken into account while formulating treatment goals (American Physical Therapy Association, 2001). A study published in 2001 (Baker et al.) sought to discover if physical therapists involve patients in goals setting. If therapists did involve patients, other purposes of the study were to determine the methods physical therapists use for this activity and if there was a relationship between patient participation and patient satisfaction with the examination. Finally, the study sought to discover the attitudes of physical therapists toward patient participation in goal setting. Twenty-four physical therapists participated in the study (two therapists withdrew since they were unable to recruit patients), and they recruited 81 patients. Patients were all 65 years of age or older and had a non-neurologic primary diagnosis. Each therapist audiotaped the initial examination of five different patients according to their usual routine. The Participation Method Assessment Instrument (PMAI) was used to record the data from the audiotapes. In addition, physical therapists and patients completed an opinion survey. Study results showed that physical therapists felt collaborative goal setting was important. Patients responded that they were very satisfied or extremely satisfied in working with the therapist to set goals. However, the authors' conclusion from the PMAI

was that there were many instances in which this participation was not fully realized. Another finding from this study was that only 50% of therapists agreed or strongly agreed with the statement, "I learned how to involve patients in goal setting in school" (p. 1122). Although there were further findings from this study, they are not discussed here because the patient population is dissimilar to the patient example. This is a limitation for comparison purposes, but the study does point out the possibility that physical therapists may not fully implement a collaborative process with patients, even though they feel it is important. This could be because therapists feel unprepared for these tasks (Baker et al., 2001).

Along similar lines, an analysis (Wise, 2001) of cardiac rehabilitation clinical practice guidelines discussed the possibility that cardiac rehabilitation programs were not meeting learners' needs. The critique was that the programs were based on rational behavior change examples that do not include mind-body integration, transformative learning and strategies to address social barriers. There were limited attempts to offer family education that would have given the patient social support. Programs used rational ways to promote behavior change, and this did not address the emotional impact of the illness. Programs did not incorporate people's spiritual beliefs into care. Thus, learners may have needs that are unmet by programs that are based on rational behavior change educational orientation. Individual learner's needs should be assessed.

Researchers in a meta-analysis (Kok, van den Borne & Mullen, 1997) on the effectiveness of health education and health promotion discussed how the effectiveness of health education programs could be improved by the use of a systematic planning method and the application of relevant principles of change. A 1992 meta-analysis

(Mullen, Mains & Velez) of controlled trials of cardiac patient education found that programs that had higher ratings for observance of five educational principles had better outcomes for patients' adherence to the therapeutic regimen. The five principles were as follows: 1) reinforce positive behavior, 2) offer feedback on progress, 3) individualize the educational program (allow learners to set the pace of learning and to obtain answers for their questions), 4) facilitate behavior and 5) assure the content and educational methods are relevant to the learner's interests and circumstances. Many of these principles are similar to those already discussed in the sections on theories of learning and adult learning.

In support of the cognitive-behavioral approach to patient education, researchers used a randomized controlled trial design to assess the effects of an educational-behavioral joint protection program for people with rheumatoid arthritis (Hammond & Freeman, 2001). Participants and their partners attended small group sessions (four to eight people) and were given an information pack and workbook. A range of educational methods was used. Participants practiced joint protection methods, used mental rehearsal of actions, set goals, received feedback from the group and group leader and used problem-solving methods. Educational, behavioral, motor learning and self-efficacy principles were used. The intervention for the standard care group included group sessions of six to twelve people (participants and partners). These consisted of brief talks from a variety of healthcare professionals and also included discussion and demonstration and practice of exercise, joint protection and relaxation techniques. Information leaflets were provided. Study results showed that the educational-behavioral method was more

effective for teaching joint protection and changing behavior. There were also significant health benefits for the treatment group.

The authors of an article on teaching to promote behavioral change discussed patient teaching in nursing practice (Saarmann, Daugherty & Riegel, 2000). The authors related how the imparting of information, on its own, was inadequate in promoting behavior change. The nursing language does not usually address concepts such as "readiness to learn, readiness to change, or motivation" (p. 282). Traditional approaches such as the use of external motivators (fear, confrontation and coercion or paternalism) were felt to be ineffective. Instead, educational approaches that recognize a person's stages of change, use motivational interviewing and cognitive-behavioral therapy were advocated. This article acknowledged the importance of motivation in behavior change and suggested ways for nurses to help individuals be motivated for change. This article also supported the idea of working collaboratively with patients.

A 2005 article in the journal *Patient Education and Counseling* discussed the need for a new paradigm among health professionals in diabetes care (Anderson & Funnell). The authors discussed how the concept of "patient compliance" fits into the "acute-care paradigm" (p. 154) in which health professionals take responsibility for solving patients' problems. Instead, a new paradigm using patient empowerment was suggested. The authors described it as follows: "The empowerment approach requires a change from feeling responsible *for* patients to feeling responsible *to* patients. This means acting as collaborators who provide patients with the information, expertise and support to make the best possible diabetes self-management decisions based on the patient's own health priorities and goals" (Anderson & Funnell, 2005, p. 155).

This statement was very powerful in the ideas it conveyed. Taken in the context of the patient example, this would make the patient responsible for his own health care decisions. The physical therapist would be a source of information and support. Any decisions would be the patient's to make. As stated by Croft (1980), "The therapist's inclination to solve the patient's problems, offer advice, and approve or disapprove of ideas suggested by the patient must be controlled" (p. 1036). Instead, the goal would include effective communication that informed patients about their health condition, identified the patient's goals and was a collaborative process between patient and physical therapist.

Summary

Theories of learning include behaviorism, cognitive-information processing theories and phenomenological and humanistic theories. Elements of these theories have informed educational practices in patient education programs discussed thus far. Behaviorism was highlighted in Fordyce et al.'s (1986) study on a behavioral approach (graded activity) to the treatment of low back pain. This approach was found superior to the traditional management used with a control group. Elements from the cognitive-information processing theories comprised part of the cognitive-behavioral approach to treatment. The purpose of this approach was to encourage patients in self-management and help patients change their behavior and lifestyle. In the context of treatment for low back pain, this education should encourage the patient to view his pain as a common condition that can be self-managed. This educational approach pays special attention to the personal and distinctive aspects of the pain-related fear stimuli. This permits the individual to correct his misconceptions between activities and harm that are felt to be a

barrier to learning. Phenomenological and humanistic theories are concerned with the needs, attitudes and feelings of the learner. Patients who are worried about their low back pain condition may be unable to learn until their fears are addressed. Current thought for low back pain management emphasizes the importance of addressing patients' fears.

Related theories include social learning theory and adult learning. Social learning theory includes such concepts as self-efficacy and locus of control. These ideas can be related to the self-management approach to low back pain treatment. Elements of adult learning theory (androgogy) can be seen in the efforts to promote a collaborative relationship between therapists and patients. This concept also includes involving patients in developing treatment goals, a strategy that is recommended in current low back pain management.

Studies have shown that there is more that can be done to include concepts from these learning theories in patient education programs. This includes promoting a collaborative process between therapist and patient, using a range of educational methods and assessing the patient's readiness to learn. An individual's philosophy of health care may be an important factor. Educators discuss the need for moving away from the idea that health professionals are responsible for solving patients' problems. Instead, a new approach using patient empowerment addresses the importance of motivation for change.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

This chapter discusses the study's research design and methods used to develop the instruments and gather data for this study. The purpose of this study was to identify the content and design of physical therapy patient education programs recommended in the literature and to assess the consistency between these recommendations, the recommendations of physical therapy educators and the practices of physical therapist clinicians. The research questions posed for this study were:

1. What are the components (content, delivery methods) of a physical therapy patient education program for a low back derangement syndrome that are suggested by the literature in this field?
2. To what extent is there consistency among the patient education program suggested in the literature, the patient education program suggested by educators and the practices of physical therapist clinicians?

To answer these questions, information was sought from the literature, physical therapists, physical therapist educators and physical therapy program administrators. The literature provided information on the suggested components of the patient education program and on the effectiveness of these components. Physical therapists provided information on their current practices. Physical therapy educators explained their instruction of physical therapy students on the components of the patient education program. Physical therapy program administrators provided the names of physical therapy educators and brief information about their programs.

The literature was reviewed for the content and design of a physical therapy patient education program for a low back derangement syndrome. Information from

physical therapists was obtained using a survey. Information from physical therapist educators was obtained using an interview. Physical therapy program administrators were contacted by e-mail or phone and provided information using the same means.

Operational Definition of Low Back Pain

An operational description of low back pain was needed because there is a diversity of opinion among health care professionals as to the origin or pathology of low back pain (DeRosa & Porterfield, 1992). Also, low back pain can represent a continuum from the acute to the chronic situation. Classification systems have been used for categorizing low back conditions.

In a critical analysis of selected classification systems for low back pain, Riddle (1998) explained how some classification systems were designed to determine the most appropriate treatment, some to help in arriving at a prognosis and others to identify pathology. Still other classification systems have been used for conducting systematic reviews of the literature, or for developing clinical practice guidelines. These systems generally categorized low back pain as being specific or nonspecific in etiology.

The low back condition under investigation in the current study represents a category (or subgroup) from one of the available classification systems. Although this was the classification system and category eventually decided upon at the outset of the study, a rationale for using this particular system and subgroup categorization was needed. Thus, a literature review was conducted to help determine the operational definition of low back pain to be used for the current study.

The current study reviewed the available classification systems. The initial question was: Which classification system should be used for the current study? While

extensive classification systems exist, the types of patient conditions included and the process for arriving at a particular classification for individual patients vary (Riddle, 1998). Some classification schemes are inclusive to account for all potential causes of low back pain, including pain due to serious pathology (Riddle, 1998). In other systems, low back pain that was due to conditions such as serious pathology or specific pathology-based diagnoses was not considered (DeRosa & Porterfield, 1992).

In the previously discussed review published in the *Physical Therapy Journal*, Riddle (1998) selected four major classification systems for a critical analysis. The four systems were those proposed by Bernard and Kirkaldy-Willis (1987), Delitto et al. (1995) and colleagues (Fritz & George, 2000), McKenzie (McKenzie, 1981) and the Quebec Task Force on Spinal Disorders (Spitzer, 1987). These four systems were selected by Riddle because they were judged to be the most appropriate for critical evaluation based on the thoroughness of their descriptions in the literature, the frequency of their use in clinical practice and their familiarity to physical therapists (Riddle, 1998). Of the four classification systems evaluated by Riddle (1998), one was pathology-based (Bernard & Kirkaldy-Willis, 1987). Two systems (Delitto et al., 1995; McKenzie, 1981) used findings from the patient evaluation to classify patients into subgroups, for which specific forms of treatment were proposed. The fourth system (Spitzer, 1987) used features such as location of pain, stage of injury, examination findings and test results to classify patients.

The 1994 Agency for Health Care Policy and Research Guideline Number 14, Acute Low Back Problems in Adults, suggested the following broad classification of low back pain: "Nonspecific back symptoms" were symptoms occurring in the back not

believed to be associated with nerve root compromise or serious underlying condition (Bigos et al., 1994). The evidence-based clinical practice guidelines developed by the Philadelphia Panel (an expert panel convened to evaluate interventions for low back pain) used a similar nonspecific classification of low back pain as the basis for their systematic review (Philadelphia Panel, 2001). The Philadelphia Panel defined non-specific low back pain as pain located between the gluteal fold and the uppermost lumbar vertebrae and included postsurgery back pain (Philadelphia Panel, 2001).

A nonspecific classification was originally felt to be appropriate for the current study because the literature pointed to the concept that the exact pathological cause of low back pain was often undeterminable (DeRosa & Porterfield, 1992; Riddle, 1998; Spitzer, 1987) and that information was not sufficient to guide interventions (Sahrmann, 1988). There were several additional arguments to support this choice: 1) measurements obtained with the use of complex systems might be more prone to measurement error (DeRosa & Porterfield, 1992); 2) use of complex systems might require advanced training (Riddle, 1998), and, as a result, some physical therapists could be unfamiliar with the specific evaluation techniques and classification processes used; and 3) some systems were not fully defined as yet (Riddle, 1998). Consequently, only those systems that used a nonspecific definition of low back were evaluated further at this point. This eliminated most of the systems evaluated by Riddle (1998).

The nonspecific classification used by the Philadelphia Panel (Philadelphia Panel, 2001) was considered as a potential working definition for the current study. The Philadelphia Panel defined non-specific low back pain as pain located between the gluteal fold and the uppermost lumbar vertebrae and included postsurgery back pain

(Philadelphia Panel, 2001). This definition of low back pain, with the exclusion of postsurgical pain, was considered for the operational definition in the current study. Post-surgical conditions were not considered because this factor might affect the patient education program. Another consideration for the operational definition included the second and third classification categories of the Quebec Task Force Spinal Disorders (QTFSD) classification system (Spitzer, 1987). These additional categories were considered because they included the presence of radiating pain to the extremity, yet excluded pain that was postsurgical or due to other specific pathology. Including the presence of radiating pain was considered important, since researchers found that individuals who sought health care for low back pain were more likely to also have pain that radiated into the leg (Carey et al., 1996).

In consideration of the literature findings, the following operational definition was developed for the current study:

> Low back pain: pain in the lumbar region with or without radiation to one extremity, in the absence of neurological signs and without suggestion of serious pathology.

This definition provided a standardized definition of low back pain that formed the basic topic for the patient education program under investigation in this study. As feedback from physical therapy clinicians and educators was obtained, the concept of how this definition fit into the research design was further developed. The next section explains this process.

Further Development of the Operational Definition

Since physical therapists in survey research studies reported that their treatment plan would differ according to the presence or lack of radiating symptoms in the leg

(Battie et al., 1994; Poitras et al., 2005), two separate categories of the operational definition were developed. The categories were given general, descriptive labels. The first category was labeled "nonspecific, localized low back pain" and the second, "nonspecific radiating low back pain." They were defined as follows:

> Nonspecific Localized Low Back Pain: pain in the lumbar region, in the absence of neurological signs and without suggestion of serious pathology

and

> Nonspecific Radiating Low Back Pain: pain in the lumbar region with radiation to one extremity, in the absence of neurological signs and without suggestion of serious pathology.

Thus, the operational definition (using the two categories of low back pain as described above) was intended to be used as the basis for the research questions posed by the current study. The concept of the study was discussed with physical therapist clinicians in order to obtain their feedback. Their feedback was as follows:

> The categories of low back pain are too broad; treatment would differ according to the severity of the condition, or if there was a deformity present. More information is needed.

> Develop a description for each category, to help explain each category better.

> Physical therapy instructions are individualized: to attempt generalizations that are too broad is the opposite of what physical therapists do. The definitions should be more specific.

Since physical therapists felt that the categories were too generalized, the study investigator felt the operational definition could be improved upon by including additional information. This information could consist of patient history and examination

findings. The classification systems reviewed by Riddle (1998) were again reviewed, as two of these systems used findings from the patient evaluation to classify patients (Delitto et al., 1995; McKenzie, 1981). These systems classified patients with low back pain into subgroups for which specific treatments were recommended.

This form of management is in line with research opinion for purposes of improving the effectiveness of treatment (Riddle, 1998; Seferlis et al., 1998). Also, a recent study was able to associate improved health outcomes with management based on low back pain subgroup classification (Fritz et al., 2003). Yet another recent research study reported that fewer than half of the physical therapists surveyed found practice guidelines (based on a standardized definition of low back pain) helpful in the management of low back pain (Li & Bombardier, 2001), suggesting that physical therapists perceive other criteria helpful in establishing treatment programs. Thus, the introduction of patient history and examination findings consistent with a subgroup classification was believed to be helpful in addressing the criticism that the previous categories/definitions of low back pain were too broad.

Selected subgroup classifications consistent with the operational definition of low back pain used in the current study were adapted for use. In order that patient history/examination findings could be supplied for each subgroup classification, clinical scenarios were developed. The clinical scenarios were not intended to be representative of an entire subgroup, but to offer a working model of the subgroup. The clinical scenarios were given titles as follows: 1) subacute localized lumbar pain, 2) acute radiating lumbar pain, 3) subacute radiating lumbar pain and 4) localized sacroiliac pain. Thus, each clinical scenario had a title and an accompanying set of patient

history/examination findings. The clinical scenarios were submitted to physical therapists for their feedback. Their feedback was summarized as follows:

> How will the scenarios account for specialized populations or other factors for which patient education may differ (such as athletes, people of working age, *et cetera.)*

Consequently, inclusion and exclusion criteria were developed for the scenarios in order to account for specialized populations or other factors.

At the same time the clinical scenarios were being developed, a rough draft of the survey instrument was being formulated. Two facts soon became apparent: 1) in addition to patient history/examination findings, further development of patient conditions would be beneficial in order to capitalize on their relation to the patient education literature; and 2) the survey would be too lengthy if more than one clinical scenario was used. This led to the decision to use a single clinical scenario and to expand upon the patient conditions. The additional information on patient conditions would provide the study participants with a patient example to respond to. As a consequence, there was now also data on the patient's life and goals. Given these changes, the term "patient example" was now used instead of "clinical scenario."

The next section describes the development of the patient example. At the conclusion of the section, an operational definition of the patient example is provided.

Development of the Patient Example

Feedback from one of the physical therapists (consulted previously) helped in making the decision as to what the sole patient example (from among the clinical scenarios developed previously) could consist of:

> Most of the patients physical therapists see have radiating pain—these are usually the individuals who seek out medical advice. Localized low back pain is often managed by the patients themselves.

This feedback was similar to research findings previously discussed for the patient conditions associated with seeking health care for low back pain (Carey et al., 1996) and helped to reinforce the researcher's impression that the most clinically relevant patient example would have a low back pain condition in which leg pain was also present. A physical therapist educator who was consulted agreed that most patients who were seen in an orthopaedic physical therapy practice were likely to have leg pain in addition to back pain.

The type of patient example decided upon was associated with a specific subgroup classification known as the derangement syndrome (McKenzie & May, 2003). This decision was reached because the patient history/examination findings and the management for this syndrome have been well described in the literature. However, as noted previously, the patient example was not intended to be representative of the entire subgroup. Instead, the patient example had a unique set of patient conditions and circumstances. The patient conditions were designed to meet the following purposes: 1) be consistent with the operational definition of low back pain used in the current study, 2) be consistent with descriptions in the literature for a derangement syndrome and 3) give study participants a unique set of patient conditions and circumstances to respond to in developing the patient education program.

The researcher's clinical experience, information from continuing education courses (McKenzie Mechanical Diagnosis and Therapy of the Lumbar Spine), elements

from classification systems (McKenzie & May, 2003; Delitto et al., 1995), the patient education literature and feedback from educators and clinicians all contributed to developing the patient conditions for the patient example. The following description explains this content.

The patient example was made more personal by giving the patient a name and age. This allowed the inclusion/exclusion criteria to be incorporated into the example. In order to make the example as straightforward as possible, the patient's leg pain only extended to the knee. This, along with the lack of any red flags or neurological signs (these are exclusion criteria), reduced the chances that physical therapists might think the patient needed a referral back to the physician. The time frame for the treatment of the patient example began one week after injury and continued until four to six weeks after injury. This time frame was selected in order to be beyond the most acute phase of symptoms, while also avoiding the perception of a chronic condition. The patient had a limited straight leg raise test, based on the author's clinical experience with back pain patients. The patient demonstrated the centralization phenomenon. This feature was included because it was a finding unique to the derangement classification as described by McKenzie (McKenzie & May, 2003). Additionally, research has demonstrated the clinical significance of this finding (Donelson et al., 1990; Sufka et al., 1998), and the management associated with this phenomenon has been described (McKenzie & May, 2003; see also Delitto et al., 1995).

The patient example had information on impairments: lumbar spine range of motion was restricted in all directions, but more so in extension and right side bending. This information was designed to be consistent with the patient conditions developed to

this point. Information on impairments was included because this data may be helpful to physical therapists for determining intervention choices (Li & Bombardier, 2001). The patient was assigned an Oswestry (Fairbank et al, 1980) score of 40%. Including information on Oswestry scores was also considered beneficial because use of this tool has been suggested to help stage the acuteness of injury and its management (Delitto et al., 1995). The score of 40% was selected because this score was associated with moderate disability and the use of conservative means for treatment of the low back condition.

The patient example had a decreased lordosis, and symptoms were exacerbated with sitting postures. This information was drawn from McKenzie continuing education courses, in which prolonged seated postures were felt to be a contributing factor to low back pain. The patient example demonstrated postural imbalances, including rounded shoulders and a depressed chest. This information was included to provide more detail for the example. The patient's standing posture was without a spinal deformity, indicating a lateral shift was not present. A lateral shift was excluded to avoid increasing the complexity of the survey questionnaire (this finding would have led to additional management considerations).

The patient example played tennis. This seemed a likely addition to the patient description and also provided a personal goal for the patient. *The Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001) describes incorporating patients' goals into the treatment plan.

The patient example had a pain rating of 5/10. This value was felt to be appropriate to allow treatment to commence (beyond that of purely pain control), yet was

also consistent with the rest of the exam findings. Information about doing yard work, grocery shopping and having small children was also provided in the expectation that this would prompt patient education on lifting activities and body mechanics. The addition of many of these patient conditions permitted a more detailed patient example for which physical therapists could determine a patient education plan.

The written description of the patient example included classification as a "derangement syndrome" since many of the features were drawn from the description of this syndrome (McKenzie & May, 2003). For the purposes of this study, a derangement syndrome was defined as follows:

> Derangement syndrome: the conceptual model for the derangement syndrome "involves internal articular displacement that causes a disturbance in the joint, which produces pain and impairment." (McKenzie & May, 2003, p. 710). The conceptual model relates presentation of the derangement syndrome to internal intervertebral disc displacements. (McKenzie, 1981; McKenzie & May, 2003)

The patient example was printed on a single blue-colored sheet. The title was "Physical Therapist Patient Education Survey: Patient Example of a Low Back Pain Condition: Derangement Syndrome." Underneath the title, there were brief directions for the research participants, asking them to review the patient example and answer questions for the survey. Following the directions, there was a text box containing the information about the patient example. The information for the patient conditions was recorded under the headings of "Patient," "History" and "Physical Exam." Appendix A contains the written description of the patient example.

Operational Definition of the Patient Example

The following definition defines the term "patient example" as it is used throughout this study:

> Patient example: a description of a patient with a low back pain condition that is defined by pain in the lumbar region with radiation to the proximal extremity, in the absence of neurological signs and without suggestion of serious pathology. The example is classified as a derangement syndrome and supplies history and examination fiudings believed to be consistent with this syndrome. The example is not intended to be representative of all patients classified with a derangement syndrome; instead, the patient example possesses a unique set of patient conditions and other criteria believed to be pertinent for management.

Development of Physical Therapist Questionnaire

The design of this study required the development of three instruments/forms for data collection: 1) the physical therapist questionnaire, 2) the physical therapist educator interview guide and 3) the data collection form for physical therapy program administrators.

The literature was consulted for developing the first draft of the physical therapist questionnaire. Studies on patient education in physical therapy were reviewed for the content and design of the instructions. Previous studies did not focus on low back pain, (Chase et al., 1993; Gahimer & Domholdt, 1996; Sluijs, 1991a; Sluijs, 1991b) or used categories of instruction that were felt to be too broad for the current study (Kerssens et al., 1999a). This led to a decision to develop a new instrument for the current study. A list of topic areas was created from the previous studies. The literature on low back pain management was also used to help generate educational topics. All of this information

was compiled, and previously used categories were reformulated to better meet the needs of the current study.

The first version of the questionnaire was developed. Its format was as follows. Directions for completing the questionnaire were given at the top of the first page. The questionnaire had the following parts: 1) directions and 2) five topic areas corresponding to the main categories of patient instructions. Each topic area had a corresponding list of items, and each item had a list of instructional methods. Respondents could check off one or more instructional methods for each item.

This version of the questionnaire was submitted to a physical therapist educator (orthopaedic faculty in a physical therapy program) and the author's doctoral committee for review. Much feedback was received. The physical therapist educator suggested changing the format of the questionnaire to include a table, in which the questions were placed on the left side of the page with the response area on the right side of the page. Other suggestions concerned the patient example. More information for the patient example was recommended, including the following: 1) was pain onset sudden or gradual, 2) what was the effect of positioning on pain, 3) what does "chest is depressed" mean, 4) how did the patient's pain rating relate to activity level, 5) what is the interpretation of the Oswestry score, 6) what is the classification category, 7) what are "special learning needs" and 8) what are the details in the patient history and examination findings.

The researcher's committee had several questions and suggestions. One question was: How much time do physical therapists have to devote to patient education? Another suggestion was to give the patient example a different name. A third suggestion was to

include another section in the questionnaire about the resources that were available to physical therapists and patients in their setting. In this way, the responses that were received in the survey could be interpreted in the light of what was available for use.

Changes were made to the questionnaire to address these comments by the orthopaedic physical therapy faculty and the doctoral committee. The entire format of the questionnaire was altered, so that questions were located in a table on the left side of the page and responses were on the right side of the table. Headings for each instructional method were placed at the top of the table. The patient example was given a new name, "Dan," and more information was incorporated into the example. A new section was added to the questionnaire for a list of resources/methods, and respondents could check if the resource or method was available to them in their practice.

As these changes were made, some sections of the questionnaire appeared unworkable; for example, the available responses were insufficient for some items, or items were unclear. Items were made more basic and less detailed to account for these difficulties. The next version of the questionnaire had the following sections: 1) a section with questions related to how physical therapists provide patient education (including questions on the amount of time available for patient education, the available instructional resources/methods and a question on therapists' preferred teaching method); 2) a section on instructional topics; and 3) a section with questions about textbooks and continuing education courses. This newer version of the questionnaire was submitted for review by an expert in survey design.

The expert's suggestions included using a numerical system to help organize the survey. The patient example should be on a separate page of different color and should

not be stapled to the survey. Other suggestions included making the columns on the table narrower and rephrasing items for improved clarity and organization. Use of narrower columns required adding some wording to different sections of the questionnaire to describe the abbreviations for methods of instructions. These changes were implemented, and a separate blue sheet was provided for the patient example.

The questionnaire was submitted to two faculty members in physical therapy education programs for their review. One faculty was an Academic Coordinator for Clinical Education, and the other faculty was an Admissions Coordinator with a doctoral degree in education. Comments from the Academic Coordinator included: 1) add a demographics section; 2) add an item on devices/equipment; 3) explain the differences among the types of instructional resources/methods; 4) provide more clarity and consistency for the teaching methods (the teaching methods and how they are defined should be consistent with the list of resources/methods); and 5) add examples of textbooks or continuing education courses. These suggestions were applied. A table was added to the questionnaire for the list of available resources/methods, and respondents could indicate if a method or resource was available or not available. The item on preferred teaching method was removed, since this choice could vary according to the instructional content. A definitions section was used to explain the teaching methods and resources. Comments from the Admissions Coordinator included: 1) what did the term "materials handling" mean; 2) was there a need to distinguish between entry-level degrees and advanced degrees; and 3) what was the significance in the breakdown for number of years of practice in physical therapy. As a result of these comments, the item for degree level was changed to apply only to professional physical therapy degrees,

and the item on years of practice was given a different breakdown. The author's advisor suggested adding a legends (definitions and abbreviations) section to also explain other terms that might be unclear to respondents. This information was added to the reverse side of the blue sheet for the patient example.

An expert in survey design again looked at the questionnaire. Further suggestions were made, which included changing the numbering in the first section to lettering and changing the phrasing for some of the sentences. The directions section was a little unclear. Comments included adding directions on what to do for people who do not provide direct services to patients and adding a statement to check "the appropriate column for each item listed." These changes were implemented.

As a result of all of these changes, the questionnaire now had the following sections: 1) Provision of Patient Education; 2) Patient Instructions; 3) Resources; and 4) Demographics. As indicated previously, a separate, blue-colored sheet was used for the description of the patient example and legends. Appendix A contains the questionnaire and description of the patient example.

An introductory letter explaining the study and the informed consent process was developed. Additional feedback on these newer versions of the questionnaire, patient example and introductory letter was sought from the same orthopaedic physical therapy faculty consulted previously. Suggestions were to add more information about the author's background to the introductory letter (refer to Appendix A). For the patient example, it was recommended that posture and body mechanics be organized under one heading and that findings for special tests should be consistent with each other. Additional special test findings were suggested, and these were added to the example.

The addition of another special test finding (springing test) was considered, but abandoned because the interpretation of this test was too variable. All other changes were applied as recommended.

Another physical therapist educator (orthopaedic faculty in a physical therapy program) was asked to review the survey materials. Her suggestions included changing the wording of one of the sentences in the introductory letter. Further suggestions were to ask respondents to refer to the blue sheet when completing the survey. A final comment was that it was difficult to know which box to check when two different teaching methods might be used for the same topic over the course of care. In response, the wording "your usual or recommended method" was emphasized in italics to indicate that therapists would have to select their best choice in these instances (although more than one method could be checked if methods were used concurrently). Since the reviewer's comments seemed to involve the distinction between two of the teaching methods, these methods (demonstration versus individual training) were collapsed into one category.

Next, the questionnaire was given to two physical therapists and their co-workers to complete. They were asked to indicate if they had any problem with understanding or completing the survey and to determine how long it took to complete the survey. The response was that the entire survey took approximately 20 to 25 minutes to complete. No problems were reported for understanding or completing the questionnaire. The study researcher reviewed the questionnaire again to see if there were any areas that were omitted or seemed unclear for interpreting the responses. Consequently, a few survey items were added or slightly modified to permit greater clarity in interpreting the study

results. One of these changes was to include a statement about the patient example's fear avoidance beliefs. This addition was prompted by the researcher's attendance at a recent seminar and by research findings suggesting the level of a patient's fear-avoidance beliefs could impact the outcomes of therapy (George et al., 2003). A physical therapist educator was consulted regarding this addition, and his recommendation was to include this information by referring to the patient as generally having low or high-fear avoidance beliefs. A statement to this effect was included for the patient example.

Development of the Program Administrator Data Collection Form and Physical Therapist Educator Interview Guide

The next step in the design of the study was to develop the next two instruments for the study: the interview guide for physical therapist educators and the data collection form for program administrators.

Program Administrator Data Collection Form

A data collection form was developed in order to gather basic information about programs from program administrators. This data collection form consisted of a few basic questions. The questions were as follows:

1. Does your program cover the topic of patient education in more than one course? If so, what are the names of these courses (relative to instruction of patients with low back pain)?
2. Does the current curriculum (in the area of patient education) represent a change over the past five years? If so, why did these changes occur?
3. What type of physical therapy degree(s) are offered at your institution?
4. What is the class size at your institution?

These questions were developed so that the instruction of physical therapy students in patient education could be seen within the context of the program curriculum. Appendix B contains the Program Administrator Data Collection Form and cover letter.

Physical Therapist Educator Interview Guide

Information from physical therapy educators was gathered through an interview process. This method of data collection was selected because it was felt that the response rate to a survey might be minimal. Physical therapy faculty often received surveys, and the investigator felt the current study might get lost or overlooked. An interview also had some advantages over a survey, in that probing questions could be used to help explore the reasons for responses. The interview guide was developed so that it corresponded to the research questions and related back to the physical therapist questionnaire. Questions for the interview were generally categorized, but left open-ended so respondents could supply information.

The interview questions began by focusing on the role of educators in providing student instruction. Next, the content and methods of patient education were explored. Where possible, this information was obtained specific to the patient example. If an educator's instruction was not specific to the patient example, the interview process allowed this to be noted. Appendix C contains the Physical Therapist Educator Interview Guide and cover letter.

Development of Checklist for Educational Materials

A checklist was used to record the information from educational materials identified by the physical therapist survey. The primary purpose of the checklist was to provide the researcher with a way to record the patient education program that was

recommended by textbooks and continuing education courses predominant within the physical therapy profession. This information was to be reviewed in comparison with the findings from the literature review.

The checklist was developed from the research questions and literature review and was designed to be consistent with the items on the physical therapist questionnaire. The software program used for the form was Microsoft Excel. A list of instructional topics was given in a column on the left side of the form. The list corresponded to the same patient education topics as given on the physical therapist questionnaire. In addition, the checklist included an open-ended section for recording of information that was not already identified on the checklist.

The checklist was reviewed by a physical therapy program faculty member for face validity. A minor suggestion was made to provide greater clarity for the information that was recorded on the form. This change was implemented, and the checklist was ready for use. Appendix D contains the checklist.

Development of Letters for Informed Consent

After the instruments/data collection forms were completed, introductory letters were developed for the various parties involved in the study (refer to Appendices A, B and C). These parties included physical therapists, physical therapist educators (faculty) and physical therapy program administrators. The introductory letters explained the study and discussed the informed consent process. These materials were submitted to the Institutional Review Boards at the University of Tennessee in Knoxville and at East Tennessee State University. Approval was granted from both institutions, indicating the study was exempt from review by the Institutional Review Boards (IRB).

Pilot of Physical Therapist Survey

After IRB approval was obtained, the physical therapist survey was piloted with 10 physical therapists known to the study author. The physical therapists all practiced in an out-patient orthopaedic setting. Four physical therapists were Board Certified Specialists in Orthopaedic Physical Therapy, and two were certified in McKenzie Mechanical Diagnosis and Therapy. Eight questionnaires were returned to the researcher. Following is a list of comments received about the survey. Next to each comment is a description of changes made to the questionnaire in response to this feedback.

- There were two items in the methods/resource list that were numbered identically (two number twelves). *Numbering sequence was corrected.*
- The item "Simulated or actual environment for instruction in ADL/IADL" was felt to be confusing. *The wording was changed to the following: "Facilities/equipment for simulation of, or actual, environment for instruction of ADL/IADL."*
- The item "Facilities/equipment for instruction in materials handling" had two question marks next to it. *The words "lifting, carrying, etc." were added in parentheses next to the item to help explain it better.*

Further analysis of the returned questionnaires showed that there were no comments related to the patient example or demographic items. Several therapists added comments in the sections for "other methods/resources," or "other exercises," or "other instructions." There was no consistent pattern to these additions, and so additional items were not added to the questionnaire. There was only one comment related to the teaching methods, and this comment was as follows: "Verbal = very often use of pictures, examples & hand-drawn sketches." Since the study defined verbal instruction as including the possible use of charts, graphs, pictures or anatomical examples, no changes

were made. A couple of therapists listed additional textbooks or continuing education courses; however, these were variable and did not show a need for including additional choices on the questionnaire.

For therapeutic exercises, the responses showed that most therapists indicated they would provide instruction for the majority of the exercises listed. The investigator felt this might have occurred because respondents were asked to consider the patient education they would normally provide over the entire episode of care (four to six weeks). Since many therapists might feel this time span extended into the sub-acute phase of care, the investigator decided to change the duration of care for which therapists determined the patient education. The new instructions were as follows:

> The instructions should be those that you would normally provide **over the initial two weeks of care**, given that Dan's condition responds to physical therapy interventions and demonstrates normal signs of healing over the next four to six weeks.

This change was intended to make the hypothetical duration of care more consistent with the initial recovery period following injury. The study results would then be limited to this time period, but this change was thought to be helpful for the interpretation of study results.

Some final changes to the questionnaire were made. These included adding instructions for therapists to refer back to the blue sheet for definitions of terms. These instructions were added to help ensure that therapists were interpreting the terms as intended. Another change concerned the item on the use of devices/equipment. The responses to this item would not allow the author to determine which devices or equipment were felt appropriate for the patient example. Consequently, respondents

were asked to read the definitions on the blue sheet and then to specify the devices/equipment to be used. These changes were implemented, and the survey was ready to proceed.

Administration of Physical Therapist Survey

The questionnaire was prepared for mailing and included a copy of the questionnaire, patient example, and informed consent letter. Survey participants were asked to respond to the items on the questionnaire after reading the description of the patient example and definitions. In addition to demographics, the questionnaire items consisted of a list of educational resources and patient instruction topics. The list was designed to correspond to the factors a physical therapist might consider in developing a patient education program. Survey respondents were asked to select the instructions that they would normally provide for the patient example **over the initial two weeks of care**, given that the patient's condition responded to physical therapy interventions and demonstrated normal signs of healing over the following four to six weeks. For each topic, survey respondents were asked to indicate if they would provide the instruction or not. Respondents were also asked to indicate their *usual or recommended* teaching method(s) for each instruction topic they selected. More than one method could be selected if methods were used concurrently.

The physical therapist questionnaire was mailed to 300 physical therapists employed in an outpatient orthopaedic setting. The sample was drawn from a national population of members of the American Physical Therapy Association.

A list of 330 names and addresses was rented from the American Physical Therapy Association. The list was larger than needed because the American Physical

Therapy Association was unable to exclude therapists who were Board Certified Specialists from the list. The researcher eliminated any names on the list whose credentials indicated this certification. This left 300 names for the survey. The survey was prepared for mailing and sent out on October 12, 2005.

Respondents were asked to complete the questionnaire and mail the questionnaire and accompanying postcard back to the study author. A code on the postcard was used to record the return of the questionnaires. For those individuals who had not returned the postcard, a reminder notice was sent two weeks later. After two weeks, non-responders were again contacted with a re-mailing of the entire survey. The third mailing was done in mid-November, with a due date of November 30, 2005.

The next set of questionnaires was mailed to 300 physical therapists who were Board Certified Specialists in Orthopaedic Physical Therapy, drawn from a national population of members of the American Physical Therapy Association. This list of names was also rented from the American Physical Therapy Association. Since some states only had a minimal number of physical therapists with this certification, the list that was requested from the American Physical Therapy Association was stratified according to states' estimated populations.

Four groups of states were identified according to population size. The distribution of the population in the four groups was selected to allow for an estimated total of 330 names. Extra names were ordered from the states/regions in which there was an estimated small population. This was done so that any final adjustments to the list could be performed without jeopardizing sufficient representation from each state. The list received from the American Physical Therapy Association had a total of 325 names.

Three names were eliminated because two therapists had participated in the pilot study and one therapist was the study researcher. This left a total of 322 names. A total of 300 names were desired.

From the group of states with a small population, a designated quota was established for each state (to be consistent with reaching a total of 300 names for the entire list). Names were selected in the order of their appearance on the list. When that state or region's quota was reached, no further names were selected from that state/region. This process continued until the desired number of names was obtained.

The first mailing for the 300 physical therapists who were Board Certified Specialists in Orthopaedic Physical Therapy was performed on November 30, 2005. Non-responders were sent a postcard reminder approximately two weeks later, and a re-mailing of the survey was performed on December 28, 2005, with a due date of January 15, 2006.

As questionnaires were received by the investigator, they were placed in a designated location in preparation for later data entry. The codes on returned postcards were used to eliminate names from the mailing list. After the final mailing, any remaining names and addresses were destroyed.

Administration of Program Administrator Data Collection Form and Physical Therapist Educator Interview

Program Administrator Data Collection Form

The participants in this part of the study were program administrators and faculty from 20 entry-level physical therapy educational programs. The programs were drawn from a population of physical therapy programs in the United States. This sample size

approximated 10% of all programs in the United States. The programs were selected based on the following factors: geographical region, public versus private, program level and program distinction. For each program selected, two alternate programs were identified, so that if faculty from one program elected not to, or were unable to, participate, other programs could be contacted. Program administrators were contacted by e-mail or phone, requesting their program's participation in the study. An introductory letter was provided to all program administrators and physical therapy educators who were involved in the study.

The selection process for educational programs was as follows. Geographical regions were determined using the same criteria as the Commission on Accreditation of Physical Therapy Education. Nine regions of the country were identified using these criteria, and at least two programs were selected from each region. Since 20 programs were desired, an additional two programs were selected from the regions that had a higher population of physical therapy programs. From each region, the first program that was selected was based on a consensus vote among the physical therapy faculty at East Tennessee State University for programs that were considered distinctive/prominent. When necessary, this selection was done using a random numbers table. The second program from each region was selected for differing characteristics from the first program based on program level and type. A random numbers table was used as needed for this selection. The same process was followed for the alternate program choices.

Forty-two (42) program administrators were contacted by e-mail or telephone to request their participation in the study. Program administrators were sent an introductory letter and the data collection form. Administrators were given the option of providing

information by phone or e-mail. They were also asked to provide the names of faculty whose instruction included patient education. Once faculty members were identified, they were contacted by e-mail or phone to request their participation in the study. Faculty members were sent an introductory letter and a copy of the patient example. If faculty agreed to participate, an interview time was set, and the study author conducted a telephone interview on the designated date.

The following process was generally used for contacting program administrators and faculty. The first contact was usually by e-mail. The e-mail included the study materials as attachments. A few days later, an attempt was made to contact individuals by telephone. If the phone was not answered, a voice message was left, requesting the individual's participation in the study. If no response was received, a reminder e-mail was sent. If there was still no response, this contact was generally concluded, and an alternate program was contacted. This process continued until the desired number of programs (20) was reached. A total of 22 alternate programs were contacted.

Physical Therapist Educator Interview

Faculty members were contacted by e-mail or phone to request their participation in the study. The same process for contacting individuals was followed as for the program administrators. Fifty-two (52) faculty members were identified for contact. At least three attempts were made for contact, but not all faculty members responded. In the cases of non-responders, if other faculty from the same program had participated, this permitted the program to remain in the study. In two cases, none of the faculty members identified by program administrators elected to participate in the study, and an alternate program was contacted.

Thirty-two (32) faculty members elected to participate in the interviews. The data from the interview of one of these faculty members was later excluded because this faculty member's teaching was at the post-graduate level. Thus, data were available from 31 physical therapy educator interviews.

Fifteen program administrators identified more than one faculty member from their program. Of these, seven programs had participation by more than one faculty member.

Interviews were conducted by telephone on an agreed-upon date. Interview respondents were asked to respond to the interview questions after reading the description of the patient example and definitions. In addition to demographics, the interview questions focused on educational resources and patient instruction topics. As in the survey, interview respondents were asked to select the instructions that they would normally provide for the patient example **over the initial two weeks of care**, given that the patient's condition responded to physical therapy interventions and demonstrated normal signs of healing over the following four to six weeks. Respondents were also asked to indicate their *usual or recommended* teaching method(s) for each instruction topic they identified. More than one method could be selected if methods were used concurrently. On a few occasions, faculty indicated they could not recall the information for the patient example. They were given an opportunity to re-read the information on the patient example, or the study author provided a brief explanation of the patient example. The interview then proceeded. The study author took notes during the interview to record what was said. Once the interview was concluded, the study author

asked respondents if they wanted to review a typed copy of the interview notes. If respondents said yes, a copy of the interview notes was e-mailed for their review.

Administration of Checklist for Educational Materials

The results from the physical therapist survey were screened to determine the textbooks and continuing education courses physical therapists identified as contributing to the development of patient education programs. The three most frequently identified choices for each category were selected for review for the current study. Available materials were obtained and reviewed. As noted previously, a checklist was used to record the information from these sources.

CHAPTER 4: RESULTS OF THE STUDY

The findings of this study are organized by research question. Prior to reporting the findings pertinent to each question, appropriate information regarding data analysis procedures and demographics is presented.

Research Question One: What Are the Components (Content, Delivery Methods) of a Physical Therapy Patient Education Program for a Low Back Derangement Syndrome That Are Suggested by the Literature in This Field?

Findings from the literature review necessary to answer this study's first research question are divided into two categories: educational program content and teaching methods.

Literature Findings: Educational Program Content

An initial finding from descriptive studies on physical therapy practice was that the patient education program is customized according to treatment goals and patient characteristics (Battie et al., 1994; Dekker et al., 1993; Li & Bombardier, 2001; Poitras et al., 2005).

In reviewing the recommendations from the literature for educational content, Table 1 (Appendix E) categorizes the data sources for each educational topic. These sources include: 1) descriptive studies for physical therapy patient education in general practice, 2) descriptive studies for physical therapy practice for low back pain, 3) systematic reviews, practice guidelines or clinical trials pertinent to the educational topic under investigation, 4) low back pain literature, 5) physical therapy professional literature, 6) articles from the education literature regarding learning theory, 7) related literature (including government reports and articles from the physical therapy, orthopaedic, epidemiological or biomechanics literature), and 8) textbooks.

As seen in Table 1, a number of educational topics were identified by numerous data sources. In other cases, topics were infrequently identified.

Patient Education Topics That Are Supported by Research and Professional Standards: Level 1 Findings From the Literature

The following topics were recommended for the patient education program in the literature (see Table 1 in Appendix E). To be included in Level 1 findings, these topics had to be supported by systematic reviews, practice guidelines, clinical trials or physical therapy professional conduct/practice standards. The documents that pertained to professional conduct/practice standards included the *Guide for Professional Conduct* (American Physical Therapy Association, 2004) and the *Standards of Practice for Physical Therapy* (American Physical Therapy Association, 2003). The *Guide for Professional Conduct is* a document developed by consensus by the Ethics and Judicial Committee of the American Physical Therapy Association (APTA)) and the *Standards of Practice for Physical Therapy* is a consensus-based document subjected to a vote in the House of Delegates of the APTA. Although designated as Level 1 findings, it is important to recognize that some of the research support was mixed.

1. The current condition and its risk factors. The patient would benefit from information about the condition and its risk factors. The effectiveness of this education was supported by clinical trials when included with other educational topics. Additionally, all the identified data sources recommended this education. Finally, education about the health condition is perceived important within the profession; it is included in the *Guide for Professional Conduct* (American Physical Therapy Association, 2004).

2. *Plan of care.* The patient should be educated about the physical therapy plan of care. Several sources recommended this education, including the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). Two sources described this education from the standpoint of general physical therapy practice and did not relate it specifically to low back pain management (Chase et al., 1993; Simonds & Kanters, 1990). Education on the plan of care is perceived important within the profession because it is included in the *Standards of Practice for Physical Therapy* (American Physical Therapy Association, 2003) and in the *Guide for Professional Conduct* (American Physical Therapy Association, 2004).

3. *Self-limiting nature of low back pain and the importance of resuming normal activities.* Education on the self-limiting nature of back pain was suggested in the literature for encouraging a self-management approach to low back pain, a tenet from adult learning theory. Other aspects of this education could help to relieve patients' fears, an important concept from phenomenological and humanistic theories of learning. This education was also considered important from a cognitive-behavioral standpoint, in which misconceptions regarding low back pain could be addressed. Use of a cognitive-behavioral approach was found to be beneficial for individuals with sub-acute and chronic low back pain (Klaber Moffett et al., 1999). Another study (Burton et al., 1999) supported using an educational booklet to communicate this education for patients with acute, nonspecific low back pain. Research by George et al. (2003) suggested that this education, when combined with a graded exercise program, was only beneficial for patients with elevated fear-avoidance beliefs. Finally, Hazard et al. (2000) found that this

education had no effect on pain, health care visits or work absence on workers with occupational back injury.

4. Resume normal activities as tolerated. A topic important for the patient education program includes providing information on the role of activities. The recommended advice is that the patient should try to resume normal activities as tolerated. The effectiveness of this education was supported by systematic reviews (Abenhaim et al., 2000; Hagen et al., 2002; van Tulder et al., 2006) and a controlled trial (Malmivaara et al., 1995).

5. The importance of patient participation in setting management goals. The patient is likely to benefit from education on the importance of patient participation in setting management goals and on identifying his/her own personal goals of therapy. This education is recommended by several sources, including the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). From the field of adult learning theory, patient participation in setting goals is considered key because it can help promote a sense of self-efficacy. Additionally, this education correlates well with humanistic learning theories. This education is also perceived important within the profession because it is part of the *Standards of Practice for Physical* Therapy (American Physical Therapy Association, 2003) and the *Guide for Professional Conduct* (American Physical Therapy Association, 2004). Although supported by professional standards, no randomized controlled trials were found that supported the effectiveness of this education (specific to the management of low back pain).

6. The use of physical agents for pain control. Education on the use of physical agents for pain control was regularly suggested in the literature and was reported as a

patient education topic in descriptive studies of physical therapy practice. The effectiveness of heat and cold was evaluated in a systematic review (French et al., 2006). Specifically, conclusions could not be reached regarding the use of superficial cold because of limited available evidence. There was moderate evidence from a small number of trials to support the use of continuous heat wrap therapy in patients with acute and sub-acute low back pain. A drawback to this systematic review is that the patient conditions were dissimilar to the current study.

7. Therapeutic exercises. A number of studies assessed the use of therapeutic exercises in the treatment of acute low back pain. Some studies investigated their use with a nonspecific classification of low back pain, while others used a sub-group classification or had specific inclusion criteria. Generally, research did not support the use of therapeutic exercises for the management of acute nonspecific low back pain. There was one exception, and this study (Pengel et al., 2002) used a different time period to define the acuity of the back condition. Drawbacks to the aforementioned studies are that the patient conditions were dissimilar to the current study.

Other studies examined the use of specific types of exercises for the treatment of non-specific low back pain, or other classification of low back pain. The studies that pertained to the patient conditions/sub-group classification under investigation in the current study will be discussed.

8. Patient-specific directional preference exercises (exercises designed to achieve centralization of symptoms). The use of patient-specific exercises concordant with the patient's directional preference was suggested by a variety of data sources, including

descriptive studies of physical therapy practice, textbooks and journal articles on low back pain management.

Several studies investigated the effectiveness of these exercises (in some articles, these exercises were used as part of the "McKenzie Method" of treatment). A study by Cherkin et al. in 1998 found that patients receiving the McKenzie Method of physical therapy had outcomes similar to chiropractic manipulation and had only slightly improved outcomes compared to patients receiving an educational booklet. A study conducted by Stankovic and Johnell in1990, and a follow-up to their study in 1995, supported the McKenzie Method of treatment over a "mini back school" (1990, p. 120).

Results from a multi-centered randomized controlled trial by Long et al. (2004) supported the use of exercises concordant with patients' directional preference. Advantages to this study included the use of a management approach similar to the process used in physical therapy practice. As a result, the patient population was limited to patients who exhibited a directional preference. This made the patient conditions similar to the current study. One of the drawbacks to this study was that the majority of the patients' back conditions were subacute or chronic. This was dissimilar to the patient example, whose condition would be considered acute. Another drawback was the lack of a true control group, thus limiting the study's conclusions to the type of exercises that should be used, rather than whether exercises should be used at all.

Based on this research, when deciding upon the type of exercises to be used, exercises concordant with the patient example's directional preference were recommended by the literature.

9. Aerobic capacity/conditioning endurance exercises. These exercises were described in several data sources, including descriptive studies of physical therapy practice, textbooks and journal articles on low back pain management.

One study investigated the effectiveness of a specific type of these exercises. A study by Chok et al. (1999) supported the use of endurance exercises over a control group for individuals with subacute low back pain. The researchers concluded, "Endurance exercise is considered to expedite the recovery process for patients with an acute episode of low back pain" (p. 1032). A disadvantage to this study was that a nonspecific classification of low back pain was used for the inclusion criteria. Consequently, a number of patients in the study may have had patient conditions that were unmatched to the current study. Another disadvantage included that 12 subjects were lost from the study due to absenteeism or personal reasons.

10. Graded exercise program. Use of a graded exercise program was investigated in several research studies. One study (Fordyce et al., 1986) supported the use of this program for patients with acute low back pain. A limitation to this study was that the patient conditions were not well described. Another study (Klaber Moffett et al., 1999) pertained to the subacute phase of care, making it unmatched to the current study. A third study (George et al., 2003) used a graded exercise program in conjunction with patient education, making it difficult to determine the effects of the exercise program alone.

As indicated in the title of this subsection, all topics included to this point have what the researcher has defined as Level 1 findings; that is, topics evaluated by research studies or included in professional practice standards. The next section of findings

focuses on topics found in the literature, but not grounded in research support, which will be referred to as Level 2 findings.

Patient Education Topics Suggested by the Literature: Level 2 Findings

The following educational topics were suggested by the literature, but were not supported by systematic reviews or clinical trials and were not described as part of physical therapy professional practice standards (see Table 1).

11. Activities and activity modification. There are a number of suggestions in the literature relating to activities or activity modification. In most cases, this education involved advice for how to perform or modify activities as a result of the low back condition.

12. Posture/positioning. This education was included as a component of treatment programs in several studies. A number of descriptive studies demonstrate its use in physical therapy practice. Education on posture and positioning is also frequently described in textbooks and in the low back pain literature. Although frequently suggested, the effectiveness of this education has not been evaluated on its own merits.

13. Body mechanics. This education was suggested by several sources, including descriptive studies of physical therapy practice, the low back pain literature and related articles.

14. Ergonomics/work modifications. Education on ergonomics/work modifications was included in the treatment group of one study. A number of studies reported the use of this education in physical therapy practice, and its use is suggested by the low back pain literature.

15. Lifting instructions. Lifting instructions were frequently suggested in the low back pain literature as a patient education topic.

16. The use of devices and equipment. Education on the use of devices and equipment was suggested in the literature and was reported as a patient education topic in descriptive studies of physical therapy practice. An evidence-based review concluded there was a lack of evidence for or against the use of lumbar supports in acute low back pain. Although there was a lack of evidence, the use of devices/equipment was described in a variety of data sources.

17. Health, wellness and fitness. Education on health, wellness and fitness was listed as one of the educational topics that may be used for management of impairments associated with spinal disorders in the *Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). This education was also described in descriptive studies of physical therapy practice.

18. Self-care. The use of education or strategies to promote self-care was frequently suggested in the low back pain literature and was described in studies of physical therapy practice. This education was also a component of treatment programs in a few experimental studies. Additionally, patient education in self-care was promoted by the education literature. No studies were found that examined the effectiveness of this education as an individual treatment in the management of acute low back pain.

19. Home exercises/home program. The use of home exercises or a home program was described as a patient education topic in descriptive studies of physical therapy practice. This education was also recommended in an article on the management of low back pain.

20. Bed rest. Education on the use of bed rest was depicted in one descriptive study of physical therapy practice. A systematic review of bed rest for acute low back pain and sciatica (Hagen et al., 2000) concluded that the use of bed rest was not recommended over advice for staying active. However, an international report concluded that bed rest should not be prescribed, but was authorized if the level of pain indicated it, as for the case of acute low back pain in the absence of sciatica. If used, bed rest was recommended to be intermittent and have a minimal duration. For acute low back pain with sciatica, up to ten days of strict bed rest was authorized.

Other Topics: Level 2 Findings

The following educational topics were listed sporadically in the literature in descriptive studies of practice or in articles for low back pain management (see Table 1).

- Role of imaging studies
- Signs/symptoms of complications
- Stress management
- Rest
- Prevention
- Back school
- Medications

There were also several topics that were rarely described in the literature. These included: basic safety precautions, functional mobility, living rules, sports/hobbies, health services, back care, instructions/advice and family/spouse education. Only one or two sources identified these topics, and several of them may have overlapped with topics already discussed. Consequently, these topics were not included in Table 1.

Additional Therapeutic Exercises

The following types of exercises were infrequently described in the literature or were only described for use in specific circumstances unmatched to the patient conditions

in the current study. As a result, these exercises were also not included as patient education topics in Table 1.

- Spine stabilization exercises
- Core stabilization exercises
- Specific home exercise program
- Isometric flexion exercises
- Aquatic exercises
- Range of motion exercises
- Exercises to decrease pain
- Neural tissue gliding exercises
- Postural exercises
- Strengthening exercises
- Balance, coordination, or agility exercises
- Gait and locomotion exercises
- Relaxation and breathing exercises
- Spinal flexion exercises

Literature Findings: Teaching Methods

The following section summarizes the literature findings for teaching methods (definitions of teaching methods are provided in the "Terminology" section of Chapter 2 on pp. 26-28). In reviewing the recommendations from the literature, Table 2 categorizes the data sources for each teaching method. These sources include: 1) descriptive studies for physical therapy patient education in general practice, 2) descriptive studies for physical therapy practice for low back pain, 3) systematic reviews, practice guidelines or clinical trials pertinent to the educational topic under investigation, 4) low back pain literature, 5) physical therapy professional literature, 6) articles from the education literature regarding learning theory and 7) related literature (including government reports and articles from the physical therapy, orthopaedic, epidemiological or biomechanics literature). In many of the sources, teaching methods were not the focus of

the study/article and thus were not fully described. As a result, the data in Table 2 should be viewed as only partially complete.

Teaching Methods That Are Supported by Research and Professional Standards: Level 1 Findings

The following teaching methods were recommended for the patient education program in the literature. To be included in this category, these methods had to be supported by systematic reviews, practice guidelines, clinical trials or physical therapy professional conduct/practice standards (see Table 2).

Individualized handouts. Studies have found that individualized handouts are used in physical therapy practice. This teaching method has also been suggested for the treatment of low back pain. Nordin et al. (2002), in a paper on self-care techniques for low back pain, included handouts as one of the ways information could be communicated. The self-management approach to back pain proposed by Klaber Moffett (2002) also endorsed the use of a written and illustrated guide to promote better adherence to exercise instruction.

A few studies have examined the effectiveness of written instructions. Reo and Mercer (2004) found that the use of a handout alone was less effective than live or videotaped modeling for achieving accurate performance of upper extremity exercises. Other researchers found that videotaped instruction was superior to the use of still-photographs in education of healthy subjects (Weeks et al., 2002). Schneiders et al. (1998) found that verbal instruction supplemented by written and illustrated exercise materials was superior to verbal instruction alone for exercise compliance in acute low back pain.

To summarize, individualized handouts are used in physical therapy practice and are suggested for the treatment of low back pain. Their use has been found to enhance verbal instructions for exercise compliance. However, when used independently, handouts were found less effective than live or videotaped modeling or instruction.

Pre-published material. Studies have reported that pre-published materials are used in physical therapy practice. The use of pre-published materials has also been suggested for low back pain management. Klaber Moffett (2002) recommended the use of an educational booklet as reinforcement for self-management of back pain. Nordin et al. (2002), in a paper on self-care techniques for low back pain, included brochures as one of the ways information could be communicated.

Of the studies pertinent to the patient conditions used in this study, there were two studies that examined the effectiveness of educational booklets/pamphlets in educating patients (Burton et al., 1999; Hazard et al., 2000). The topic of the educational materials was on the self-limiting nature of low back pain and the importance of resuming normal activities. One of the studies (Burton et al., 1999) found that use of the educational booklet resulted in improvement in beliefs about activity and the inevitable consequences of back trouble. The other study found that the pamphlet had no effect on pain, health care visits or work absence (Hazard et al., 2000).

Educational booklets/pamphlets were also evaluated in other studies. These studies were less pertinent to the patient conditions used in this study; however, the studies were reviewed in the previous section on "Educational Booklets/Pamphlets/Leaflets" in Chapter 2 to help determine the effectiveness of this

teaching method. Conclusions were that educational booklets/pamphlets/leaflets were able to change patients' beliefs, knowledge, pain, function and behavior.

The receptiveness of the intended audience for pre-published materials is relevant to this discussion. A survey conducted in Israel of community inhabitants with low back pain found that a majority of respondents believed written material on low back pain management was at least partially effective (Jacob et al., 2003). Chapman and Langridge (1997) reviewed the literature and determined there is an acceptable reading level for health education leaflets. Other factors found important for leaflets are the layout and design (Dickinson et al., 2001).

In summary, research findings support that educational booklets/pamphlets/leaflets are used in physical therapy practice and are an effective teaching method. Research findings also suggest that factors such as readability, layout and design are important for these materials' effectiveness. Finally, most of the research regarding the effectiveness of educational materials corresponded to content that promoted the concepts of the self-limiting nature of back pain and the benefits of an early return to activity. Thus, the use of educational materials for this content is what is supported by the research.

Computer or video program. The physical therapy literature reports that videotapes or slides are rarely used in physical therapy practice. Reo and Mercer (2004) found that live or videotaped modeling was more effective than a handout alone for instruction of upper extremity exercises. Weeks et al. (2002) found that videotaped instruction was superior to the use of still-photographs in exercise instruction of healthy subjects. In contrast, Lysack et al. (2005) found that there were no differences between

computer-assisted video instruction and verbal/written instructions for instruction of a home exercise program. As previously discussed, suggestions have been put forth to explain the conflicting results of this study with the previous studies.

In summary, the available literature suggests that computer or video programs are rarely used in physical therapy practice. Although infrequently used, two studies found videotapes more effective than handouts or still photographs in exercise instruction. The third study that was reviewed in regard to video exercise instruction found no statistically significant benefit to the use of video instruction.

Individual training. Journal articles on low back pain management, descriptive studies on physical therapy practice and experimental studies suggest that individual training is a recommended teaching method in the treatment of patients with low back pain. In a paper encouraging a self-management approach to back pain, Klaber Moffett (2002) stated that exercises should be carefully taught and demonstrated to patients, followed by the patient practicing the exercise with guidance from the clinician. An outcome study on non-operative treatment of herniated lumbar intervertebral discs stated a dynamic stabilization program should be taught by an experienced physical therapist or exercise trainer using a one-on-one instructional method (Saal & Saal, 1989).

Individual training was not described as a method or tool of patient education in the previously described national survey of physical therapists conducted by Chase et al. (1993). Instead, this survey identified demonstration as a teaching method. The use of demonstration is a component of the "individual training" method as defined in the current study (see definition on p. 28). The survey found that the majority of physical

therapists reported they used demonstration as a method or tool of patient education "nearly always/most of the time" (Chase et al., 1993, p. 789).

Several studies have assessed the effectiveness of the individual training approach. Reo and Mercer (2004) found that live and videotaped modeling were more effective than a handout alone for achieving accurate performance of exercises. Friedrich et al. (1996) compared the effects of a brochure versus therapist teaching on therapeutic exercise instruction for individuals with neck or back pain. Study conclusions were that exercise instruction based on the use of a brochure alone often resulted in incorrect exercise performance, compared to exercises learned under the supervision of a physical therapist. The value of practice and periodic reappraisal on the ability to perform lumbar stabilization exercises was investigated in a study of non-impaired volunteers (Hagins et al., 1999). Study conclusions were that this instructional method appears necessary for participants to be able to perform progressively more difficult lumbar stabilization exercises.

To summarize, the individual training approach is recommended for instruction of therapeutic exercises in low back pain management. This approach has been found to be superior to the use of brochures and handouts for exercise instruction. Practice and periodic reappraisal appear necessary for the learning of progressively more difficult exercises. Research supports that demonstration, a component of individual training, is a teaching method frequently used in physical therapy practice.

Teaching Methods Suggested by the Literature: Level 2 Findings

The following teaching method was often suggested by the literature, but was not supported by systematic reviews or controlled trials, nor was it described as part of physical therapy professional practice standards (see Table 2).

Verbal instruction. Studies have reported that verbal instruction is used in physical therapy practice, but no studies were found that specifically evaluated the effectiveness of verbal instruction as a teaching method. However, in a study investigating the effect of educational strategy on exercise compliance, Schneiders et al. (1998) found that verbal instruction supplemented by written and illustrated exercise materials was superior to verbal instruction alone for exercise compliance.

In an article discussing patient teaching in nursing practice, Saarmann et al. (2000) suggested that simply imparting information, even when supplemented by a pamphlet or videotape, is inadequate in promoting behavior change. Instead, educational approaches that promote an individual's motivation for behavior change were suggested and include assessing the individual's readiness to change, using motivational interviewing and using cognitive-behavioral interventions.

In summary, verbal instruction is used in physical therapy practice. Its effectiveness as a teaching method has not been specifically evaluated on its own merits, but may be enhanced by the addition of written and illustrated exercise materials. The literature on learning theories suggests that further benefit may be realized when teaching approaches for behavioral change are used to supplement or modify verbal instruction.

Research Question Two: To What Extent Is There Consistency among the Patient Education Program Suggested in the Literature, the Patient Education Program Suggested by Educators and the Practices of Physical Therapist Clinicians?

Survey Returns and Analysis

Analysis of Data

The SPSS data editor was used for analysis of the data from the returned surveys. The statistical analysis was limited to descriptive statistics. Of the 600 surveys that were mailed out, 264 completed questionnaires were returned, resulting in a 44% response rate. In addition, 13 individuals sent back uncompleted questionnaires. Reported reasons for not completing the questionnaire included practicing in an unrelated area of physical therapy practice (eight respondents); having no time to complete the survey (three respondents); and not practicing physical therapy (two respondents). The majority of the uncompleted questionnaires were from physical therapists who were not Board Certified Specialists. This probably occurred because the mailing list for this group could only be narrowed down to practice setting, and not to practice area. These 13 responses were removed from the data set for the analysis.

A follow-up for non-responders was not possible because names and addresses were no longer available (after conducting the survey, a separate list of non-responders was not maintained for reasons of confidentiality). Thus, it was not possible to contact a sample of non-responders to determine if their reasons for lack of response resulted in a potential bias in the survey results. This factor represented an emerging limitation of this research.

Demographics

Of the 264 completed questionnaires, approximately 43% were completed by males, 55% by females. Ages ranged from 20 to 65, with the most common age range being ages 40 to 44 (roughly 22% of respondents), and the next most common being ages 45 to 49 (roughly 18% of respondents). Age ranges from 25 to 29; 30 to 34; 35 to 39; and 50 to 54 each accounted for between approximately 11 and 15% of respondents. Other age categories accounted for 3% or fewer of the respondents. Forty-one percent (41%) of respondents were under age 40, while approximately 58% were age 40 and above. Respondents reported a varied number of years in physical therapy practice. Categories spanned zero to greater than 26 years. Distribution of respondents across these categories was roughly equal.

Professional degree. Survey respondents varied in their responses regarding the professional physical therapy degree/certificate programs they had completed. Approximately 33% of respondents listed the Baccalaureate degree as their professional physical therapy degree, while the same number (33%) listed the Master's degree. Approximately 11% of respondents listed the Doctor's degree, and roughly 4% listed the Post-Baccalaureate Certificate. Some individuals listed more than one degree; the most common of these combinations was the Baccalaureate and Master's degree at roughly 6% of the respondents. Other degree combinations accounted for 3% or fewer of the respondents.

Board-Certified Clinical Specialists in Physical Therapy. A little more than 54% of respondents stated they were Board Certified Clinical Specialists in Orthopaedic

Physical Therapy. Thirty-nine percent (39%) of respondents stated that they did not have Board Certification.

Certifications. Roughly 54% of respondents listed various types of certifications. The most frequently listed single categories of certifications were as follows: American Physical Therapy Association Credentialed Clinical Instructor (approximately 9% of respondents); Manual Therapy Certification (approximately 8% of respondents); and McKenzie Certification (approximately 6% of respondents).

Employment and practice. A little more than 83% of respondents listed full-time work employment, and roughly 14% listed part-time employment.

The majority of respondents practiced in an outpatient setting (close to 88% of respondents). Approximately 63% listed a private outpatient office or group practice as their primary practice setting, while 25% listed a health system or hospital-based outpatient facility/clinic as their primary practice setting. Other categories of practice settings each accounted for less than 3% of respondents.

Patient-care visits per week. Approximately 49% of respondents reported that they provided more than 50 patient care visits during a week. Approximately 17% provided between 41 and 50 visits per week, and approximately 13% provided between 31 and 40 visits per week. Roughly 18% of respondents provided 30 or fewer visits per week.

Available time for patient education. The majority of respondents (approximately 65%) reported that they usually had 16 or more minutes available to them for patient education per patient care visit. Almost 30% of respondents reported that they usually had 6 to 15 minutes available to them for patient education. Only a small number (a little

more than 1%) of respondents reported that they usually had one to five minutes available for patient education (see Figure 1).

Patient education methods and resources. Physical therapists reported that the following methods or resources were available to them or patients for patient education: verbal instruction (approximately 98%); copy machine to produce individualized handouts (97%); anatomical models (approximately 90%); computer/printer to produce individualized handouts (close to 78%); pre-published handouts (non-individualized) (close to 78%); photographs (close to 69%); charts or graphs (approximately 64%); pre-published internet resources (non-individualized) (close to 40%); and computer or video program (approximately 28%) (see Table 3).

Available treatment and exercise equipment. Physical therapists reported that the following treatment or exercise equipment was available to them or to patients: treatment or mat table (close to 97%); progressive resistive exercise equipment (approximately 96%); aerobic exercise equipment (approximately 92%); physical agents (approximately 92%); materials handling equipment (approximately 81%); and therapeutic pool (almost 30%). Equipment for instruction in activities of daily living or instrumental activities of daily living was available as follows: in the home (almost 59%); at work (approximately 52%); and in the community (approximately 40%) (see Table 4).

Patient-care services. Close to 55% of respondents reported their facilities did not offer additional services from other health care professionals. Conversely, almost 44% of respondents stated that additional services were available at their facility.

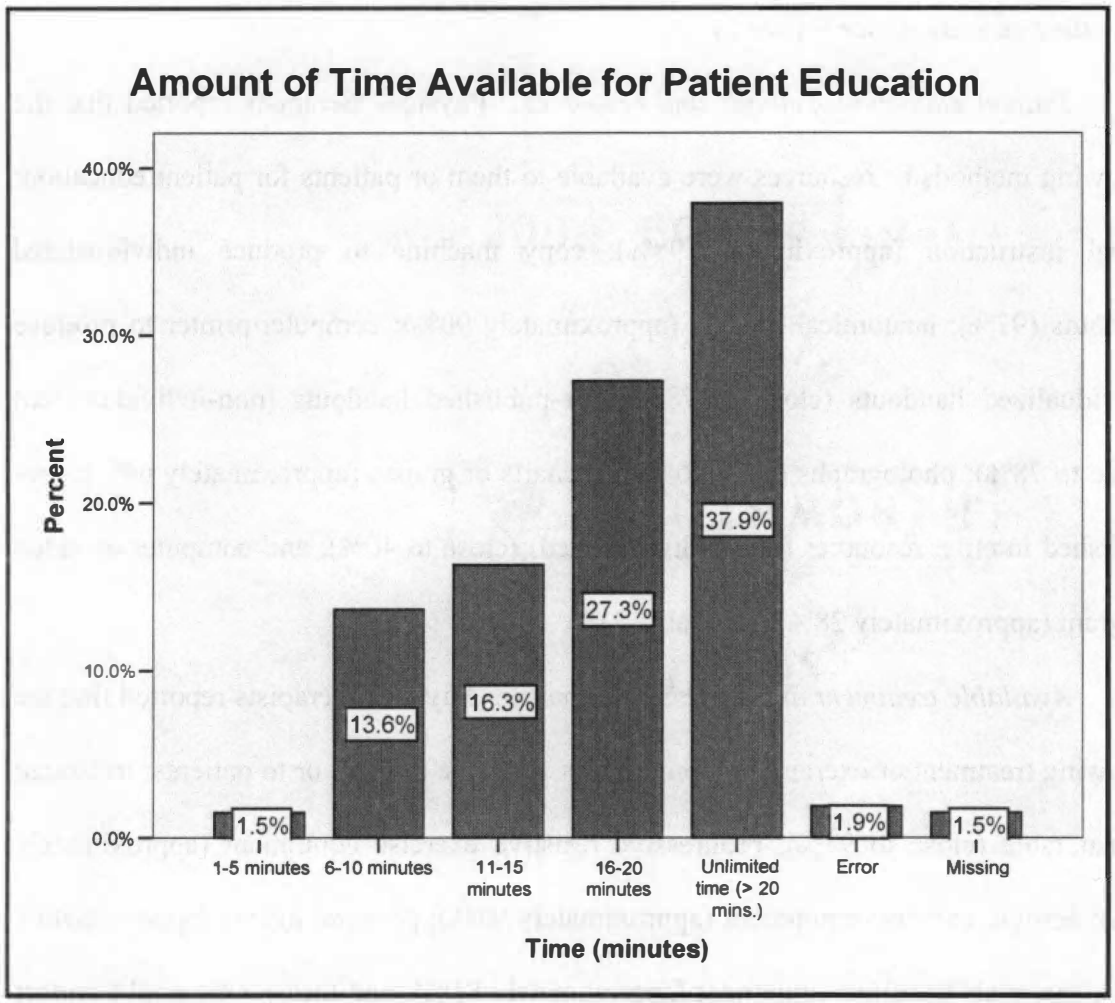


Figure 1: Physical Therapist Survey: Amount of Time Available for Patient Education

Table 3

Physical Therapist Survey Responses (%) for Availability of Teaching Methods and Resources

Method or Resource	Available	Not Available	Missing	Error
Verbal Instruction	98.1	-	1.9	-
Copy Machine to Produce Individualized Handouts	97.0	1.5	1.5	-
Anatomical Models	90.2	7.2	2.3	<1
Computer/Printer to Produce Individualized Handouts	77.7	18.2	4.2	-
Pre-Published Handouts: Non-Individualized	77.7	20.1	1.9	<1
Photographs	68.9	22.7	8.3	-
Charts or Graphs	64.4	29.2	6.4	-
Pre-Published Internet Resources	39.8	52.7	7.6	-
Computer or Video Program	28.4	62.5	8.7	<1

Table 4

Physical Therapist Survey Responses (%) for Availability of Treatment or Exercise Equipment

Treatment or Exercise Equipment	Available	Not Available	Missing	Error
Treatment/Mat Table	96.6	1.5	1.9	-
Progressive Resistive Exercise Equipment	95.5	2.7	1.9	-
Aerobic Exercise Equipment	92.4	5.7	1.9	-
Physical Agents	92.4	3.0	4.5	-
Materials Handling Equipment	81.1	15.9	3.0	-
Therapeutic Pool	29.9	64.8	4.9	<1
Equipment for Instruction in ADL/IADL (Home)	58.7	36.0	5.3	-
Equipment for Instruction in ADL/IADL (Work)	51.5	42.8	5.7	-
Equipment for Instruction in ADL/IADL (Community)	40.2	52.7	7.2	-

Almost 60% of respondents stated their practice included assistance from physical therapist assistants or other personnel in providing patient care services. Thirty-nine percent (39%) reported they provided physical therapy patient care without assistance from physical therapist assistants or other personnel.

Educational materials and textbooks used in developing patient education programs. As noted previously, the results from the physical therapist survey were screened to determine the textbooks and continuing education courses physical therapists identified as contributing to the development of patient education programs. The three most frequently identified choices for each category were selected for review for the current study.

Textbooks. The three most popular choices for textbooks included texts by David Magee, Robin McKenzie and H. Duane Saunders. The most recent available editions of these texts were used for comparison with the literature findings.

The textbook by David Magee, *Orthopaedic Physical Assessment* (2002), primarily deals with the assessment of musculoskeletal conditions and does not offer information on management. Consequently, this textbook was not examined further.

The textbooks *The Lumbar Spine, Mechanical Diagnosis and Therapy, Volume 2,* by Robin McKenzie and Stephen May (2003), and *Evaluation, Treatment and Prevention of Musculoskeletal Disorders, Volume 1: Spine,* by H. Duane Saunders and Robin Saunders Ryan (2004), offer a number of management recommendations. These recommendations were listed in Tables 1 and 2 (see Appendix E)

Continuing education courses. The three most popular continuing education courses included "Mechanical Diagnosis and Therapy, The McKenzie Method," by

Robin McKenzie, CNZM, OBE, FCSP (Hon), FNZSP (Hon), Dip MT; "Manual Therapy, The Mulligan Concept," by Brian Mulligan, FNZSP, Dip MT; and "Orthopaedic Manual Therapy, The Maitland Concept," by Geoffrey Maitland, MBE, AUA, FCSP, FACP, MAppSc. Textbooks or course materials from these sources were reviewed. They are summarized as follows.

The McKenzie Method was discussed in the previous section, and the reader is referred to this section for a review of the information.

The textbook *Manual Therapy: "NAGS", "SNAGS", "MWMS" etc.*, by Brian R. Mulligan (1999) was used as a resource for describing the Mulligan Concept. The Mulligan Concept is a type of manual therapy; however, there are also some self-treatment techniques.

Information regarding the Maitland techniques was drawn from the textbook, *Maitland's Vertebral Manipulation,* 7th edition (Maitland, Hengeveld, Banks & English, 2005). The treatments advocated for the lumbar spine consisted primarily of manual therapy techniques and did not offer recommendations for patient education. However, the text contained an Appendix for Clinical Tips (for factors related to the total management of spinal disorders), and this section included some patient education.

The recommendations from these texts were listed in Tables 1 and 2 in Appendix E.

Physical Therapy Educator Interview Responses and Analysis

Analysis of Data

The interview data were reviewed and organized according to common themes. This process began by using one of the interview transcripts and designating a theme for

each topic of education. Data from subsequent interview transcripts were incorporated into the existing themes, or new themes were developed as needed. After reviewing and collating a number of transcripts, the topic headings for some themes were collapsed, resulting in a number of common themes throughout the interview data.

Physical Therapy Educator Interview Participation

A total of 52 physical therapy educators (faculty members) were contacted for interviews. Twenty (20) faculty members declined to participate or failed to respond to the contacts. Five (5) of these faculty members were from two programs that were ultimately excluded from the study because of the lack of faculty participation. Thirty-two (32) faculty members elected to participate in the interviews. The data from one interview was excluded because this faculty member's teaching was at the post-graduate level. This resulted in a total of 31 physical therapy educator interviews. Sixteen (16) programs had more than one faculty member identified by the program administrators. Of these, seven programs had participation by more than one faculty member.

A follow-up for non-responders was not conducted. Thus, it was not possible to determine if the reasons for lack of response resulted in a potential bias in the interview results. This factor represented an emerging limitation of this research.

Demographics

Of the 31 physical therapy educator interviews, all the faculty members were instructors in physical therapy programs. The teaching area of the majority (21 faculty members) was in the orthopaedics or the musculoskeletal area of the program. The teaching area of the remaining faculty (10 faculty members) was in education or another content area of the program.

Professional degree. For professional degree program completed, 18 interview respondents indicated they had completed the Bachelor's degree (one of these individuals volunteered that he or she went on to complete a professional doctorate in physical therapy). Eleven (11) respondents indicated they had completed the Master's degree. Four of these individuals volunteered that they had completed an additional degree in physical therapy: two at the professional doctorate level, one PhD and one Doctor of Health Science in Physical Therapy. Two respondents indicated they had completed the professional Doctoral degree.

Job title. For job title, 2 interview respondents held rank as Instructor or Lecturer; 20 respondents held rank as Assistant Professor (five of these individuals also had a role in clinical education); 6 respondents held rank as Associate Professor (one of these individuals also had a role in clinical education); and 2 respondents held rank as Professor. One (1) respondent was the Director of the Physical Therapy Program.

Board-Certified Clinical Specialists in Physical Therapy. Eighteen (18) interview respondents indicated they were not Board-Certified Specialists, while 13 respondents indicated they were Board-Certified Clinical Specialists (12 as Orthopaedic Certified Specialist (OCS) and one as Geriatric Certified Specialist (GCS)).

Certifications. Six (6) respondents indicated they were certified in manual therapy (four as Certified Manual Therapists (MTC), one in Orthopaedic Manual Physical Therapy Certification (OMPT) and one as a Certified Orthopaedic Manual Therapist (COMT)).

Amount of time for patient education. For instruction of physical therapy students, the interview respondents were asked to respond to the following question: "How much time do you recommend that a physical therapist should spend on patient education during a visit?" Fourteen (14) of 31 respondents indicated that no specific amount of time was recommended. Of this group, some respondents offered further information including the following: the recommended amount of time would vary according to the treatment goals and individual patient circumstances (four respondents); patient education is considered important (three respondents); patient education is immersed throughout the treatment episode (two respondents); every visit needs to deal with patient education (one respondent); and patient education should be thorough (one respondent). Five (5) of 31 interview respondents indicated patient education would take place throughout the treatment session. Other interview respondents offered a specific percentage or amount of time per visit: 5 of 31 respondents indicated a percentage of time ranging from 20% to 80% of the visit (with an average of 54% of the visit). Four (4) of 31 respondents indicated an amount of time ranging from 3 to 30 minutes per visit (with an average of 13 minutes per visit). Six (6) of 31 respondents indicated the amount of time recommended would vary from the initial visit to subsequent visits.

Study Findings: Educational Program Content

Patient Education Topics Suggested by All Three Data Sources: The Literature (at Levels 1 or 2), Practicing Therapists and Educators

The current condition and its risk factors. Close to 98% of physical therapists checked off the item, "Current condition and risk factors for its development" as education they would provide for the patient example (see Figure 2).

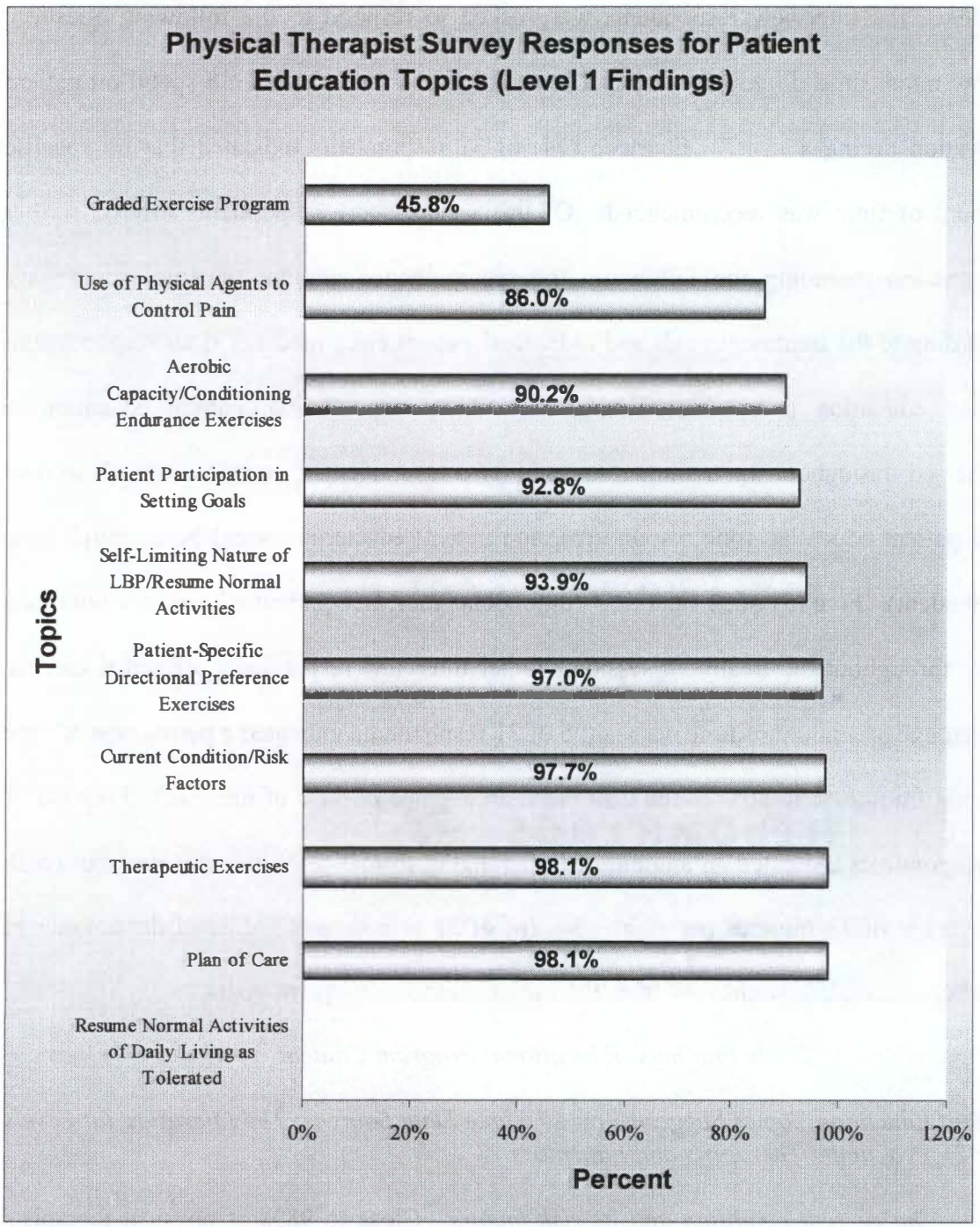


Figure 2: Physical Therapist Survey Responses for Patient Education Topics (Level 1 Findings)

Approximately 55% of the interview respondents indicated they would instruct students to provide education about the patient's current condition. Faculty used a variety of terms to describe this content, including helping the patient to understand the underlying mechanism, etiology, anatomy, physiology, risk factors, prognosis or biomechanics associated with the condition (see Table 5 on p. 210).

Therapeutic exercises. The literature showed conflicting results regarding the use of therapeutic exercises. While several systematic reviews concluded that exercises were not recommended during the acute phase of care, one systematic review supported the use of exercises during the subacute phase of care (defined as a time period from seven days to seven weeks after onset of symptoms).

Twenty items on the physical therapist questionnaire corresponded to different types of therapeutic exercises. For the most popular type of therapeutic exercise (postural exercises), approximately 98% of respondents agreed with the use of therapeutic exercises for the patient education program (see Figure 2 on p. 208).

Approximately 77% of interview respondents indicated they would instruct students to include therapeutic exercises for the patient education program. For the majority of the responses, educators identified the use of patient-specific directional preference exercises (see Table 5 on p. 210).

Patient-specific directional preference exercises (exercises designed to achieve centralization of symptoms). Ninety-seven percent (97%) of survey respondents selected the item "exercises designed to achieve centralization of symptoms" (see Figure 2 on p. 208). Approximately 65% of interview respondents stated they would instruct the patient in extension exercises or exercises that produce centralization of symptoms. Various

Table 5

Physical Therapist Educator (Faculty) Interview Responses for Patient Education Topics (Level 1 Findings)

Topics	Faculty Responses (n = 31) %
Therapeutic Exercises	77.4
Patient-Specific Directional Preference Exercises	64.5
Current Condition and its Risk Factors	54.8
Patient Participation in Goal Setting	25.8
Plan of Care	19.4
Aerobic Capacity/Conditioning Endurance Exercises	9.7
Physical Agents to Control Pain	9.7
Self-limiting Nature of Low Back Pain and the Importance of Resuming Normal Activities	3.2
Resuming Normal Activities of Daily Living as Tolerated	-
Graded Exercise Program	-

terminology was used to describe these exercises, including "centralization," "extension program," "extension protocol," "extension principle," "prone lying," "prone on elbows," "press-up exercises," "active extension exercise program," "McKenzie extension principle," "prone extension exercises," "home exercise program based on the patient's movement bias" and "directional preference and exercises associated with this." In only two cases were the terms "prone extension exercises" or "extension exercises" used without further clarification of the type or purpose of the exercises. It is possible, but seems unlikely, that in these two cases, the exercises were used for a purpose other than centralization of symptoms (see Table 5 on p. 210).

Activity modification. There were three items on the physical therapist survey that related to education on modifying activities. The following items were checked off by physical therapists as education they would provide for the patient example: "altering the amount of loads/forces acting on the lumbar spine" accounted for approximately 97% of physical therapists; "use of rest periods during activities" accounted for approximately 94% of physical therapists; and "altering the rate or pace of performing activities" accounted for approximately 91% of physical therapists (see Figure 3 on p. 213).

Close to 55% of interview respondents stated they would instruct students to provide patient education on activity modification. Some faculty explained the need for this education in general terms, while others provided more specific information. These specific instructions included: modify or interrupt seated positioning (six faculty members), avoid flexion (five faculty members), promote extension movements or positioning (three faculty members), modify lifting activities or yard work (two faculty

members) and avoid activities that exacerbate symptoms or peripheralize pain (two faculty members). These results are represented in Table 6 on p. 214.

Posture/positioning. At least 97% of survey respondents selected education on posture and positioning. The corresponding items on the questionnaire were "positioning for static postures" and "positioning for dynamic postures" (see Figure 3 on p. 213).

Roughly 52% of interview respondents stated that they would recommend providing patient education on posture and positioning. A theme running throughout these recommendations was for physical therapists to explain the impact of posture and positioning on daily life (four faculty members) and in relation to sitting, standing and lying postures (two faculty members). Several faculty members offered additional specific recommendations regarding posture and positioning, and these were as follows: use positioning that decreases symptoms (two faculty members), use a lordodic seated posture (two faculty) and avoid or modify sustained postures (two faculty members). These results are represented in Table 6 on p. 214)

Patient Education Topics Suggested by at Least Two Data Sources

The plan of care. Approximately 98% of physical therapists checked off the item, "plan of care"as education they would provide for the patient example (see Figure 2). Approximately 19% of all interview respondents stated they would instruct students to provide patient education related to the plan of care. One faculty member described this patient education in terms of informing the patient about the purpose of the exercises, while two faculty members described this education as providing information about the proposed interventions and their effectiveness. The remaining faculty described this education more globally in terms of the entire treatment plan (see Table 5 on p. 210).

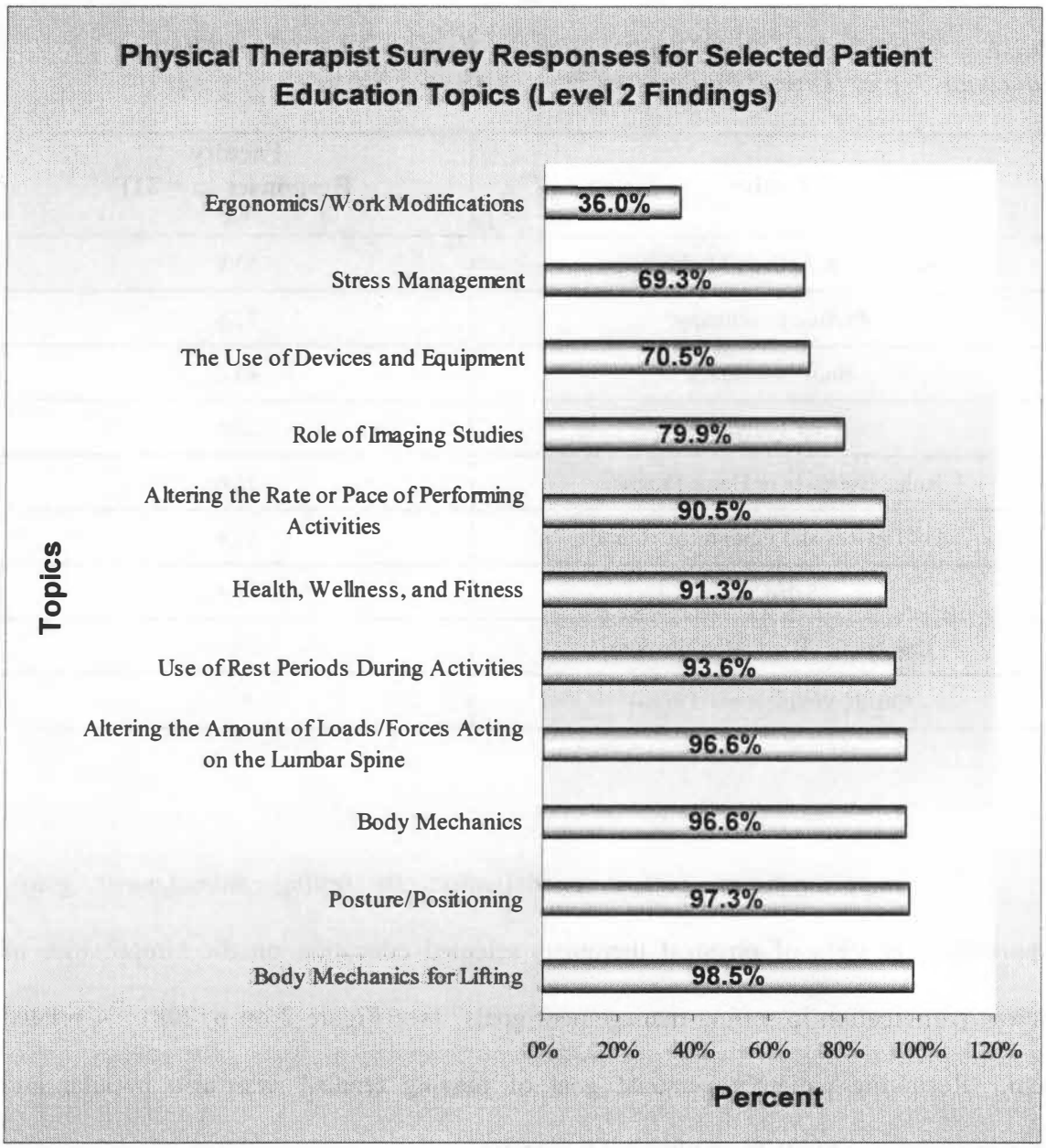


Figure 3: Physical Therapist Survey Responses for Selected Patient Education Topics (Level 2 Findings)

Table 6

Physical Therapist Educator (Faculty) Interview Responses for Selected Patient Education Topics (Level 2 Findings)

Topics	Faculty Responses (n = 31) %
Activities & Activity Modification	54.8
Posture/Positioning	51.6
Body Mechanics	45.2
Lifting Techniques	22.6
Home Exercises or Home Program	22.6
The Use of Devices and Equipment: Lumbar Roll	19.4
Self-Care	19.4
Ergonomics/Work Modifications	16.1
Health, Wellness and Fitness	9.7

The importance of patient participation in setting management goals. Approximately 93% of physical therapists selected education on the "importance of patient participation in setting management goals" (see Figure 2 on p. 208). A related item, "Resuming patient's personal goal of playing tennis," was also popular and accounted for roughly 93% of physical therapists.

At least 25% of the interview respondents stated they would educate students on collaborating with the patient in determining the patient's needs or in setting goals for treatment. Four faculty members stated that physical therapists should attempt to discover what the patient wants and needs to know. Three faculty members stated that

physical therapists should try to identify the patient's perspective regarding their illness. One faculty member described providing education for the patient's personal goals for tennis and activities of daily living (see Table 5 on p. 210).

Aerobic capacity/conditioning endurance exercises. Approximately 90% of survey respondents selected patient education on "aerobic capacity/conditioning endurance or reconditioning" exercises (see Figure 2 on p. 208).

Conversely, roughly 10% of interview respondents recommended aerobic, endurance or conditioning exercises. When recommended, these exercises were to be used in combination with extension or centralization exercises. One faculty member commented that exercises to address deconditioning would be used later in the treatment in an effort to address other factors that might be contributing to the disc problem (see Table 5 on p. 210).

The use of physical agents to control pain. At least 85% of survey respondents selected education on "the use of physical agents to control pain" (see Figure 2 on p. 208). Approximately 10% of interview respondents identified this education (see Table 5 on p. 210).

Body mechanics. Education on body mechanics was one of the patient education topics suggested by the literature. At least 95% of survey respondents selected the following topics for the patient education program: "body mechanics for instrumental activities of daily living" and "body mechanics for activities of daily living" (see Figure 3 on p. 213). Approximately 45% of interview respondents indicated they would include patient education for body mechanics; seven of these faculty members specifically

indicated instruction should include lifting activities, as discussed below (see Table 6 on p. 214).

Body mechanics for lifting. Education on lifting techniques was one of the patient education topics suggested by the literature at Level 2 findings. Almost 99% of survey respondents agreed with this education (see Figure 3 on p. 213). Roughly 23% of interview respondents indicated instruction for lifting activities (see Table 6 on p. 214).

Health, wellness and fitness. Approximately 91% of survey respondents selected education on "health, wellness and fitness" (see Figure 3 on p. 213). In contrast, only approximately 10% of interview respondents recommended patient education on health and fitness (see Table 6 on p. 214).

The use of devices and equipment. Roughly 71% of survey respondents selected education on "the use of devices and equipment," while less than 20% of educators identified this education (see Figure 2 on p. 208 and Table 5 on p. 210).

Self-limiting nature of low back pain and the importance of resuming normal activities. Close to 94% of physical therapists selected education on the "self-limiting nature of low back pain and the importance of resuming normal activities" (see Figure 2 on p. 208). Only one educator identified this education and said that, since the patient example had low fear-avoidance beliefs, this education was not warranted, but that components of it could occur (see Table 5 on p. 210).

Patient Education Topics Primarily Recommended by a Single Data Source: Literature

Self-care. Education in self-care was only identified by approximately 19% of interview respondents (see Table 6 on p. 214) and was not listed as a separate topic on the physical therapist survey.

Ergonomics/work modifications. Instruction in ergonomics or work modifications was only selected by 36% of survey respondents (see Figure 3 on p. 213) and identified by less than 20% of interview respondents (see Table 6 on p. 214).

Home exercises/home program. Education in home exercises or a home program was only identified by approximately 23% of interview respondents (see Table 6 on p. 214) and was not listed as a separate topic on the physical therapist survey.

Patient Education Topics Primarily Recommended by a Single Data Source: Survey

The role of imaging studies. Education in the role of imaging studies was infrequently suggested in the literature and rarely identified by interview respondents. However, almost 80% of survey respondents selected the item, "role of imaging studies and specialty referrals" for the patient education program (see Figure 3 on p. 213).

Stress management. Education in stress management was infrequently suggested in the literature and in the interview responses. However, approximately 69% of survey respondents selected this topic for the patient education program (see Figure 3 on p. 213).

Therapeutic exercises. The following types of exercises were not supported by the literature for the patient education program. In some cases, this was because clinical trials had not been conducted. In other cases, clinical trials did not pertain to the patient conditions under investigation.

Interview respondents also infrequently suggested these exercises. However, a majority of the survey respondents selected these exercises for the patient education program (see Figure 4 on p. 218). They are as follows (percentages are approximate):

- Postural exercises (98% of survey respondents)
- Extension exercises (96% of survey respondents)
- Spine stabilization exercises (93% of survey respondents)

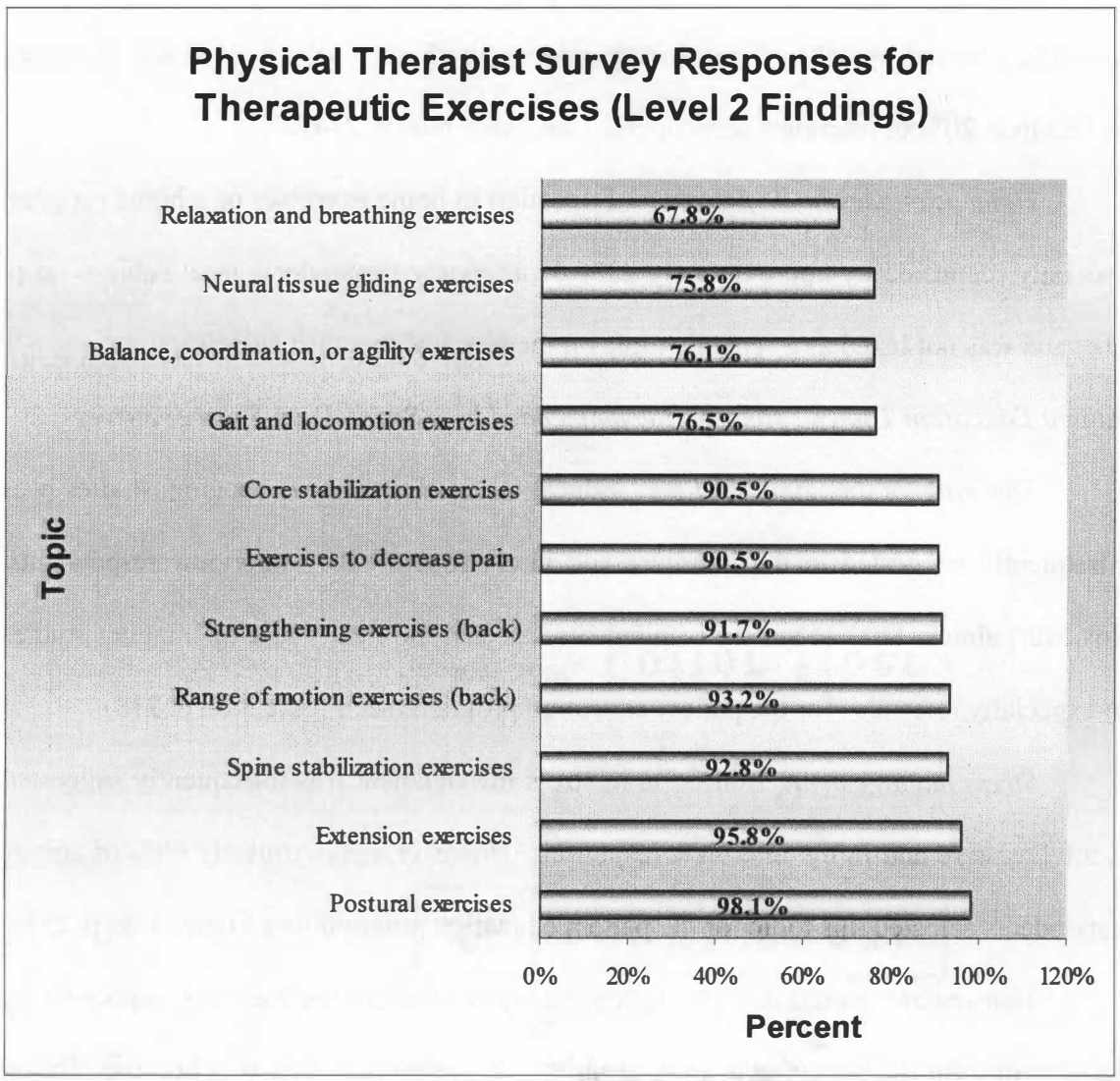


Figure 4: Physical Therapist Survey Responses for Therapeutic Exercises (Level 2 Findings)

- Range of motion exercises (93% back; 78% leg; 68% abdomen)
- Strengthening exercises (92% back; 85% leg; 93% abdomen)
- Exercises to decrease pain (91% of survey respondents)
- Core stabilization exercises (91% of survey respondents)
- Neural tissue gliding exercises (76% of survey respondents)
- Gait and locomotion exercises (77% of survey respondents)
- Balance, coordination, or agility exercises (76% of survey respondents)
- Neural tissue gliding exercises (76% of survey respondents)
- Relaxation and breathing exercises (68% of survey respondents)

Patient Education Topics Infrequently Suggested in Any of the Data Sources

The following patient education topics were infrequently suggested in the literature (for the patient conditions under investigation), the interview responses or the survey responses. These topics are listed below:

- Spinal flexion exercises
- Aquatic exercises
- Specific home exercise program
- Isometric flexion exercises
- Signs and symptoms of complications
- Prevention
- Medications
- Bed rest

Study Findings: Teaching Methods

The following reported percentages for teaching methods were derived from the number of respondents who selected the patient education topic and identified a teaching method.

Teaching Methods Suggested by All Three Data Sources: The Literature, Practicing Therapists and Educators

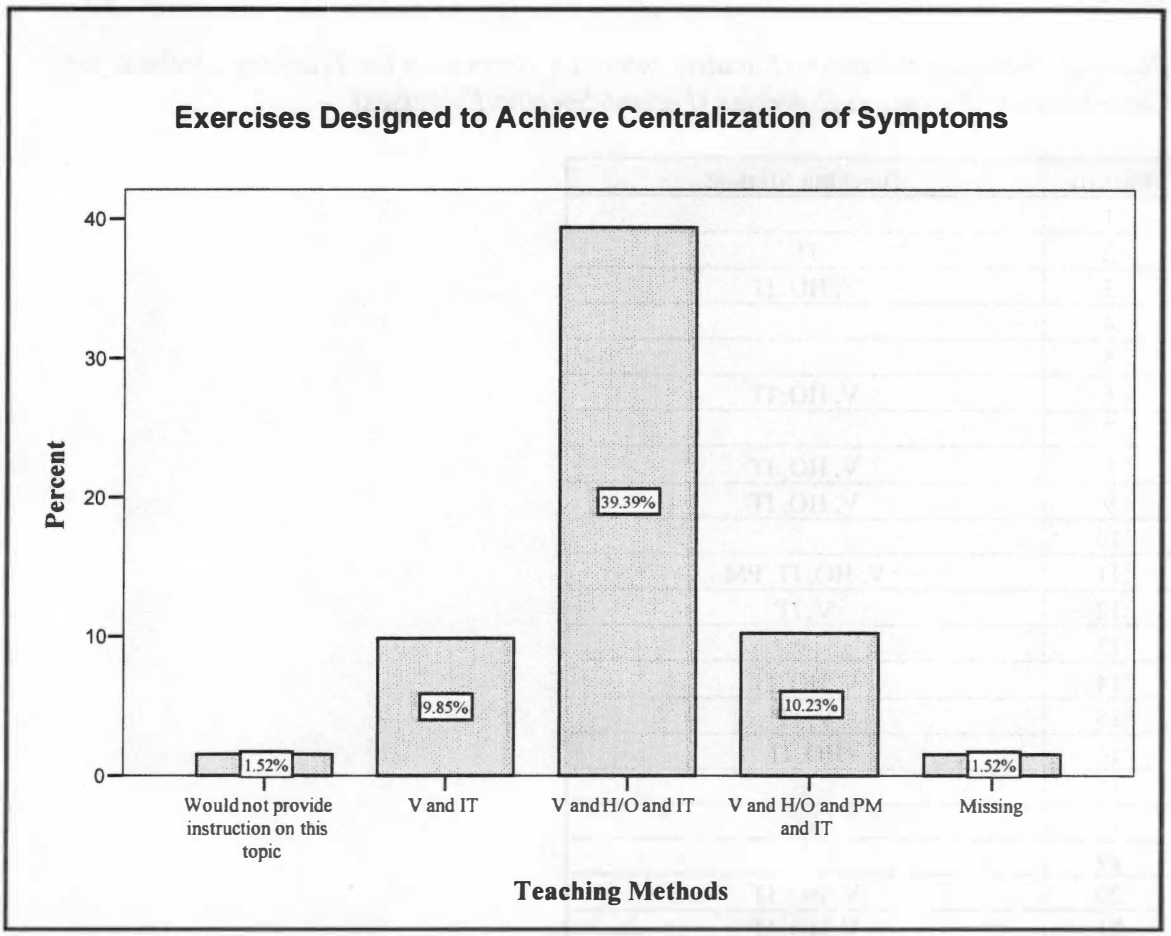
Individual training. Individual training was supported by research as a teaching method for therapeutic exercises. Specific to the therapeutic exercises identified in the current study (patient-specific exercises), approximately 85% of survey respondents and 100% of interview respondents recommended individual training alone or in combination

with other teaching methods. Typically, this method was used in combination with other methods. Figure 5 on p. 221 shows the three most frequently selected teaching methods for instruction of patient-specific exercises by physical therapists. Table 7 on p. 222 shows the teaching methods identified by educators for this topic.

Verbal instruction. Verbal instruction was suggested in the literature as a teaching method. Survey respondents selected verbal instruction for the following topics: "condition and its risk factors" (approximately 50%); "plan of care" (almost 60%); and "importance of patient participation in setting management goals" (80%). These results are represented in Figures 6, 7 and 8 on pp. 223-224 (the percentages in the figures differ slightly from those presented here because the figures include the percentage of therapists who would not include this instruction, or who left the item missing), and Table 8 on p. 224.

For interview respondents, verbal instruction accounted for a roughly similar number of respondents (all percentages are approximate): 50% (current condition/risk factors); 50% (plan of care); and 63% (patient participation/collaboration).

Verbal instruction and individualized handout. The use of an individualized handout to augment verbal instruction is supported by research for therapeutic exercise instruction. Specific to the therapeutic exercises identified in the current study (patient-specific exercises), approximately 47% of interview respondents and approximately 41% of survey respondents recommended verbal instruction in combination with an individualized handout and individual training for this education.



Legend: V=Verbal; H/O=Individualized Handout; PM=Pre-Published Material; IT=Individual Training

Figure 5: Physical Therapist Survey Responses for the Three Most Frequently Selected Teaching Methods for Exercises Desgined to Achieve Centralization of Symptoms (Patient-Specific Exercises).

Table 7

Physical Therapist Educator (Faculty) Interview Responses for Teaching Methods for Centralization/Extension Exercises (Patient-Specific Exercises)

Faculty	Teaching Method
1	
2	IT
3	V, HO, IT
4	
5	
6	V, HO, IT
7	
8	V, HO, IT
9	V, HO, IT
10	
11	V, HO, IT, PM
12	V, IT
13	
14	V, HO, IT
15	V, IT
16	HO, IT
17	x
18	IT
19	
20	V, HO, IT
21	V, HO, IT
22	
23	
24	V, HO, IT
25	IT, HO
26	
27	V, HO, IT, PM
28	
29	IT
30	V, HO, IT
31	V, IT

Note. V=Verbal; HO=Individualized Handout; PM=Pre-Published Material; IT=Individual Training; and x=Teaching Method Not Identified

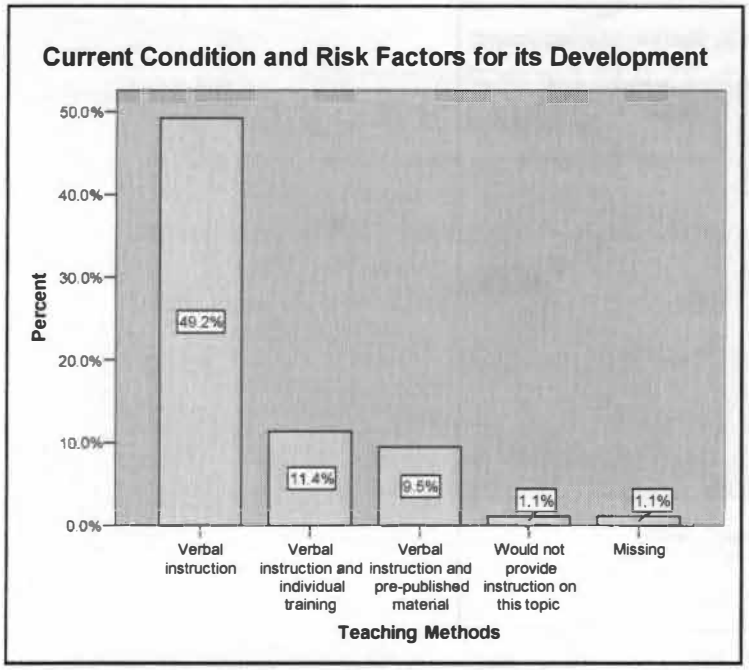


Figure 6: Physical Therapist Survey Responses for the 'Current Condition and Risk Factors for its Development' and Teaching Methods (three most frequently selected methods)

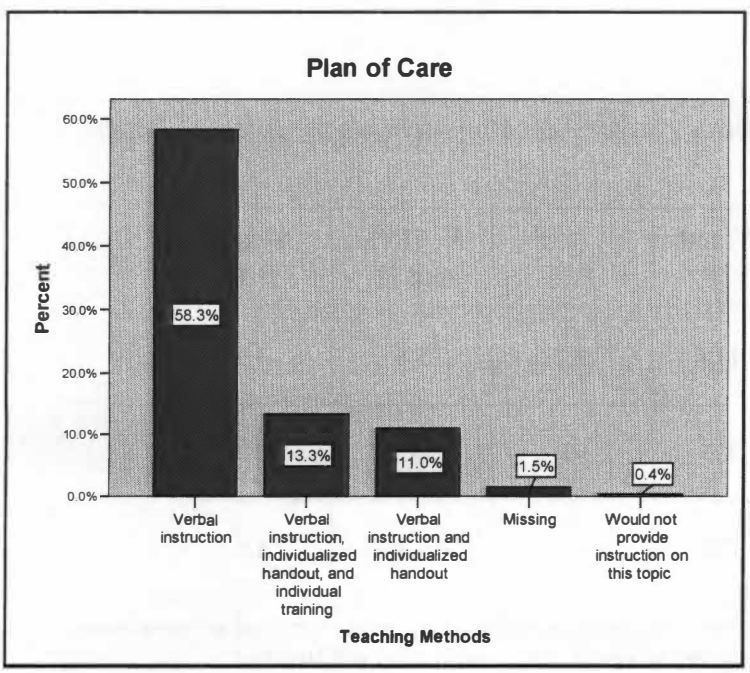


Figure 7: Physical Therapist Survey Responses for 'Plan of Care' and Teaching Methods (three most frequently selected methods)

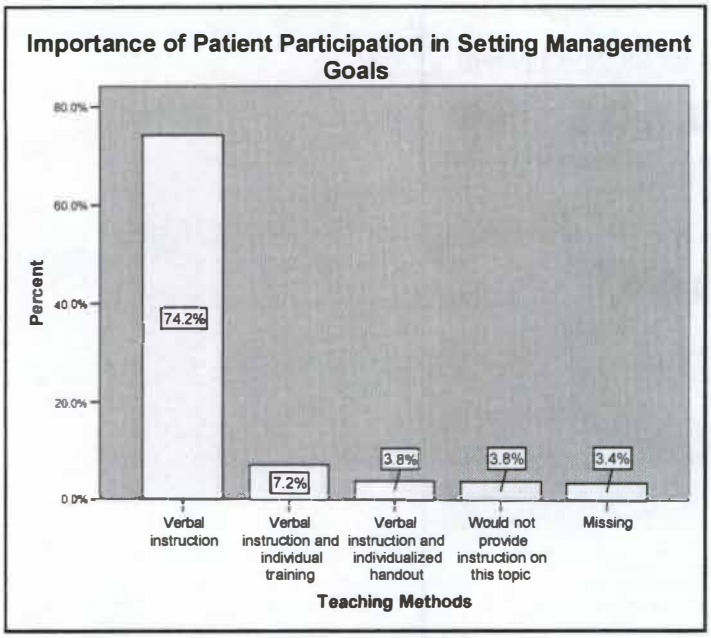


Figure 8: Physical Therapist Survey Responses for the 'Importance of Patient Participation in Setting Management Goals' and Teaching Methods (three most frequently selected methods)

Table 8

Physical Therapist Survey Responses (%) for Teaching Methods for Selected Patient Education Topics

Patient Education Topics	V	V and IT	V and PM	V, H/O, and IT	V and H/O
Current Condition and Risk Factors for its Development	**50.4**	**11.6**	**9.7**	5.8	4.7
Plan of Care	**59.5**	9.3	<1	**13.5**	**11.2**
Importance of Patient Participation in Setting Management Goals	**80.0**	**7.8**	1.2	3.3	**4.1**

Note. **Bold Font** = three most frequently selected teaching methods per topic. V = Verbal Instruction; IT = Individual Training; PM = Pre-Published Material; H/O = Individualized Handout

Teaching Methods Suggested by One Data Source

Pre-published material. The use of pre-published material to instruct patients in the "self-limited nature of low back pain and the importance of resuming normal activities" is supported by research at Level 1 findings. However, education in this topic was not identified by interview respondents; therefore, teaching methods are unavailable. For the physical therapist survey, respondents did not identify pre-published material as an independent teaching method for this topic. Instead, pre-published material was included with other teaching methods, such as verbal instruction, individual training, individualized handout and computer/video. When combined with other teaching methods, pre-published material still only accounted for approximately 13% of therapists' choices among teaching methods for this topic.

Computer or video program. The use of video programs is supported by research for therapeutic exercise instruction. However, this teaching method was rarely identified by survey or interview respondents for the therapeutic exercises specific to the current study (patient-specific exercises).

Program Administrator Interviews

Physical therapy program administrators were contacted to obtain general information about their programs and recent changes. Program administrators did not provide information on patient education program content or teaching methods.

A total of 42 programs (via the program administrators) were contacted for participation in the study. Of these, 4 program administrators declined to participate, 16 program administrators did not respond or failed to complete the data collection form and, for 2 programs, the faculty did not respond or failed to participate in an interview.

The remaining 20 programs had full participation by the program administrators and at least one faculty member. Of the participating programs, 16 program administrators identified more than one faculty member for this teaching area. Of these, seven programs had participation by more than one faculty member.

A follow-up for non-responders was not conducted. Thus, it was not possible to determine whether the reasons for lack of response resulted in a potential bias in the educator interview results. This factor represented an emerging limitation of this research.

The participating programs were as follows. Each geographical region (described previously) of the United States was represented by at least two programs. For the two most populous regions, three programs from each region participated in the study. This selection method resulted in the desired number of programs (20 in all) for participation in the study. Of the 20 programs, roughly 10 programs were considered to be distinctive or well-known. Thirteen (13) programs offered the Doctoral degree, while 7 programs offered the Master's degree. Ten (10) programs were in public institutions, while an equal number of programs were in private institutions. Class size ranged from 7 to 90 students. The average class size was 39 students.

All 20 programs covered the topic of patient education in more than one course. In response to the question, "Does the current curriculum (in the area of patient education) represent a change over the past five years? If so, why did these changes occur?" 11 program administrators responded "No," while 9 program administrators responded "Yes." Among the program administrators who responded affirmatively, reasons given for changes included: transitioning to the doctoral degree (four programs);

transitioning to evidence-based practice (two programs); desiring an increase in the amount of time and focus for this content (one program); moving to a doctoring profession and empowering patients for self-care (one program); and desiring to reflect changes in physical therapy practice (one program).

CHAPTER 5: SUMMARY, CONCLUSIONS, DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

Although limited to a specific patient condition (low back derangement syndrome), this study explored the topics that are suggested in the literature for the patient education program. This research study was able to determine how consistent the patient education program suggested by the literature was with the program suggested by educators and the practices of physical therapists. Although there were several areas of commonality, there were also areas of inconsistencies.

An emerging limitation of this study was the possibility of a non-response bias affecting the study results. The study summary, conclusions, discussion, implications, and recommendations should be viewed with this in mind.

The following section summarizes the study findings.

Summary

Educational Topics Supported by Research and Standards (Level 1 Findings)

1. The current condition and its risk factors
2. The plan of care
3. The self-limiting nature of low back pain and the importance of resuming normal activities
4. Resume normal activities as tolerated
5. The importance of patient participation in setting management goals
6. The use of physical agents for pain control
7. Therapeutic exercises
8. Patient-specific directional preference exercises (McKenzie approach)
9. Endurance exercises
10. Graded exercise program

Educational Topics Suggested in the Literature (Level 2 Findings)

1. Activities and activity modification
2. Posture/positioning
3. Body mechanics
4. Ergonomics/work modifications

5. Lifting instructions
6. The use of devices and equipment
7. Health, wellness and fitness
8. Self-care
9. Home exercises/home program
10. Bed rest

Delivery/Teaching Methods Supported by Research and Standards (Level 1 Findings)

1. Individualized handouts
2. Pre-published material
3. Computer or video program
4. Individual training

Delivery/Teaching Methods Suggested in the Literature (Level 2 Findings)

1. Verbal instruction

Topics Agreed upon by All Data Sources (The Literature, Physical Therapist Survey, and Educator Interviews)

1. The current condition and its risk factors
2. Therapeutic exercises
3. Patient-specific directional preference exercises
4. Activities and activity modification
5. Posture/positioning

Topics Agreed upon by Two of Three Data Sources

1. The plan of care
2. The importance of patient participation in setting management goals
3. Aerobic capacity/conditioning endurance exercises
4. The use of physical agents to control pain
5. Body mechanics
6. Body mechanics for lifting
7. Health, wellness and fitness
8. The use of devices and equipment
9. The self-limiting nature of low back pain and the importance of resuming normal activities

Delivery/Teaching Methods Agreed upon by All Data Sources (The Literature, Physical Therapist Survey, and Educator Interviews)

1. Individual training
2. Verbal instruction
3. Verbal instruction and individualized handout

Delivery/Teaching Methods Agreed upon by Two of Three Data Sources

There were no teaching methods agreed upon by two of three data sources.

Conclusions

Conclusions are organized by research question.

Research Question One: What Are the Components (Content, Delivery Methods) of a Physical Therapy Patient Education Program for a Low Back Derangement Syndrome That Are Suggested by the Literature in This Field?

Conclusion One

The components for the patient education program are difficult to interpret because of the lack of studies specific to a low back derangement syndrome.

A number of patient education topics were suggested for the management of acute low back pain. Only one study was found that specifically assessed patient education components for the management of a low back derangement syndrome.

Conclusion Two

The literature supports the use of selected teaching methods that are specific to individual topics.

There were few studies available for review. Of the available studies, the majority investigated teaching methods for only two educational program topics. For these topics, several teaching methods were supported (at Level 1 findings) for accomplishing a variety of learning goals.

Conclusion Three

There is a lack of agreement in the literature regarding the use of therapeutic exercises for the management of an acute low back derangement syndrome.

Systematic reviews generally do not support the use of therapeutic exercises for the management of acute, nonspecific low back pain. Individual clinical trials support the use of some types of exercises for acute, nonspecific low back pain. Specific to a low back derangement syndrome, the use of patient-specific directional preference exercises has been supported over the use of other types of exercises.

Research Question Two: To What Extent Is There Consistency Among the Patient Education Program Suggested in the Literature, the Patient Education Program Suggested by Educators and the Practices of Physical Therapist Clinicians?

Conclusion One

The results of this study do not allow for comparison of evidence-based practices and current practices of physical therapists.

Most of the research findings were equivocal or were based on the management of nonspecific low back pain. Professional practice standards are consensus-based. As a result, definitive conclusions cannot be drawn for the patient education program for a low back derangement syndrome. Thus, the major contribution of this study is a description of current practices for the patient education program.

Conclusion Two

There is a lack of consensus among the data sources in this study as to the educational program topics that should be used for the patient education program.

Findings are mixed for the number and type of educational program topics suggested. There were only a few topics agreed upon by all three data sources. These

topics are: the current condition and its risk factors; activity modification; posture/positioning; and patient-specific exercises.

Conclusion Three

The majority of participants in this study (practicing physical therapists and physical therapy educators) selected therapeutic exercises for the patient education program, while the literature findings are equivocal on this topic.

Physical therapists almost uniformly endorsed the use of therapeutic exercises for the patient education program. Approximately 77% of educators agreed with this education. In contrast, the literature findings (taken as a whole at Level 1 findings) are mixed.

Conclusion Four

The participants in this study (practicing physical therapists and physical therapy educators) differentiated teaching methods according to the topic of instruction.

Study participants primarily recommended the use of individual training for therapeutic exercise instruction, while verbal instruction was primarily recommended for topics such as the current condition and its risk factors, the plan of care and the importance of patient participation with goal setting.

Discussion

Patient Education Topics with a Lack of Consensus

For a number of topics, there is a lack of consensus among the three data sources for the number and type of topics that should be included in the patient education program. The literature describes many patient education topics at varying levels of support. Physical therapists used most of the patient education topics listed on the survey

(topics that came from the literature). Their responses may have resulted from their practical experience of what works, or from their knowledge of patient expectations. It is less likely that their professional education could have influenced their responses, since the majority of educators only identified a handful of topics.

The small number of topics identified by educators could have been due to an artifact of the study design. The educators responded to open-ended questions on an interview and did not have advance time to prepare their responses. This could have affected the completeness of their responses. Conversely, physical therapists checked off items on a questionnaire, where the number and type of topics had been determined in advance from a review of the literature.

Another reason for the relatively small number of topics identified by educators might have had to do with how the subject of patient education is taught in physical therapy professional education programs. All of the program administrators interviewed in the current study reported that this education takes place in more than one course. This factor could tend to fragment the subject, leaving individual faculty members with knowledge primarily based on their own specialty area, rather than on the content as a whole. This idea is supported by the fact that the majority of the topics identified by educators each accounted for less than 60% of the respondents, and only two topics were able to generate more than a 60% response rate among educators. These relatively low percentages indicate a lack of consensus among educators regarding the topics that should be included in the patient education program.

The lack of consensus among educators may be related to additional information supplied by the program administrators. Nine of the 20 program administrators stated

that changes had occurred in the professional curriculum for patient education over the past five years. Reasons given for changes included transitioning to a doctoral level program and further developing courses for evidence-based practice. Thus, for a significant number of professional education programs, the subject matter in patient education has recently changed. The new subject matter may reflect recent changes in accreditation guidelines for physical therapy programs (Commission on Accreditation in Physical Therapy Education, 1996; Commission on Accreditation in Physical Therapy Education, 2004). Guidelines are now more specific for this education in terms of content, achievement of goals and outcomes. Therefore, recent changes in the curriculum could be a reason for the lack of consensus regarding the patient education program as described by educators.

As noted, practicing physical therapists selected most of the patient education topics identified on the survey. Their responses may have resulted from their practical experience of what works, or from their knowledge of patient expectations. They also may have been influenced by the specific patient conditions outlined in the patient example. The therapists could have interpreted some of the patient conditions as requiring education in a particular topic. For instance, postural information was provided for the patient example, suggesting the presence of postural imbalances. Physical therapists could have interpreted this finding to require patient education in postural exercises. Another example might include education for the use of rest periods during activities; physical therapists could have decided rest periods from prolonged seated postures were appropriate.

The use of education specific to the needs of the patient is consistent with the patient/client management process described in *The Guide to Physical Therapist Practice* (American Physical Therapy Association, 2001). As a practice model, the use of this management process would have great influence on how physical therapists decide upon the patient education program.

Thus, there could be many reasons for the disparities in the number and type of patient education topics suggested by the three data sources. Some of these topics are of special interest and are discussed in the next section.

Individual Topics

In addition to education on the current condition and its risk factors, two other topics are included in physical therapy professional practice standards: patient education on the plan of care and patient education on the importance of patient participation in setting management goals (American Physical Therapy Association, 2003). Physical therapists had a high level of agreement with the professional practice standards for this education, while physical therapy educators infrequently identified this education.

The low response rate of educators on these topics may have been due to the reasons mentioned earlier. Another reason that could account for educators' low response rate may be that these topics are covered in different courses in the curriculum. The investigator requested interviews with faculty whose subject matter included patient education, but these topics could also be covered in courses dealing with communication or professional issues. As a result, the faculty interviewed would not have identified this education.

This education is also sometimes not included in textbooks; a review of educational materials shows that this education was not described in some of the educational materials reviewed. Textbooks/materials were selected for review based on the frequency with which physical therapists identified them in the survey as a resource for developing patient education programs. Since the focus of most of these textbooks/materials was on the assessment and management of orthopaedic conditions, this finding is not surprising.

It is possible that practicing physical therapists (as compared to educators) have more experience in and practical knowledge of the value of including this patient education. Education in the plan of care would ease the introduction of the various therapeutic interventions. Patient participation in setting management goals has been associated with improved patient compliance. Patient education in both of these areas could be seen as having great value.

Another topic that was popular in the literature and among practitioners, yet had a relatively low response rate from educators, was instruction in body mechanics. Approximately 45% of educators (less than a majority) identified this education. Only two topics were able to generate more than a 60% response rate among educators. When viewed in this light, 45% of educators may actually be a larger figure than it appears. Nevertheless, the topic of body mechanics may be one of the topics that indicate a lack of a consensus among educators for use in the patient education program.

Ninety-nine percent (99%) of survey respondents selected education on "lifting techniques." Although education on "lifting techniques" is infrequently identified in descriptive studies of physical therapy practice, it is possible this education was described

as "body mechanics" or some other name in the literature. This, then, would hide how often education specific to "lifting techniques" is used.

The popularity of education in lifting techniques in the survey responses may be due to several factors. Numerous authorities in the field have recommended this education for patients with low back pain (Cyriax, 1975; Klaber Moffett, 2002; McKenzie & May, 2003; Saunders & Ryan, 2004). The patient conditions for the patient example implied the use of lifting activities for grocery shopping and for caring for his small children. From an epidemiological standpoint, work that involves heavy lifting is a risk factor for low back pain (National Research Council and the Institute of Medicine, 2001), making education on proper lifting techniques a reasonable choice for the patient education program to help guard against re-injury. Finally, practicing physical therapists' level of experience and practical knowledge may have been a factor in including this education.

The majority of educators in the current study did not identify this topic for the patient education program. The reasons for this may be similar to those already described.

Ninety percent (90%) of survey respondents selected education in the "role of imaging studies." The popularity of this topic is not likely to be due to respondents' professional training, since only one physical therapist educator identified this topic during the interview. It is possible practitioners offer this education because patients ask about it, or patients may have misconceptions about the meaning of these studies. A belief that imaging studies can always indicate the cause of low back pain has been identified as one of the myths of low back pain (Deyo, 1998). A biopsychosocial

treatment model that includes addressing misconceptions (such as the use of imaging or special tests to explain the cause of back pain) has been recommended for the treatment of nonspecific lower back pain (Nordin et al., 2006). Physical therapy practitioners may be aware of these expert opinions within the field, and this may account for the high percentage of survey respondents who selected this education.

Ninety-four percent (94%) of survey respondents selected education regarding the "self-limiting nature of low back pain and the importance of resuming normal activities." Clinical trials reported conflicting results for the effectiveness of this education. Additionally, recent research suggested that, when this education is used with a graded exercise program, it is only beneficial for patients who have elevated fear-avoidance beliefs (George et al., 2003). Among the reasons proposed earlier for the lower response rate from educators, this recent research may account for the lack of popularity of this topic among educators. In contrast, survey respondents could have used this education in a generic sense in order to relieve the patient's fears and misconceptions about his low back condition. The fact that only a small percentage of survey respondents (46%) selected "graded exercise program" supports the idea that survey respondents did not see the topic "self-limit nature of low back pain and the importance of resuming normal activities" as being limited to patients with elevated fear-avoidance beliefs.

Over 85% of survey respondents selected education in "health, wellness and fitness" and in the use of "physical agents to control pain." These topics were often suggested in the literature, yet infrequently identified by educators. As with other topics, educators had a lower response rate for these topics. Educators' lower response rate may have been due to how the subject matter of patient education is spread across more than

one course, resulting in a lack of consensus among educators for the topics/content that comprise the patient education program. Physical therapists' higher response rate for these topics may have reflected their support for education that encourages self-care. Encouragement of self-care is widely promoted in articles for low back pain management (Klaber Moffett, 2002; Nordin et al., 2002) and is also a tenet of the cognitive-behavioral approach to therapy and the self-efficacy principle (Bandura, 1977a). Patient education in health/wellness/fitness and the use of physical agents to control pain would offer patients greater control over their illness.

Sixty-nine percent (69%) of survey respondents selected education in "stress management." Since only two respondents indirectly identified this topic during the educator interview, it appears unlikely that the popularity of this topic is due to survey respondents' professional training. It is possible that survey respondents were aware of the association between job stress and the occurrence of low back disorders in the workplace (National Research Council and the Institute of Medicine, 2001). Additionally, education on relaxation techniques has been suggested for patients with low back pain (Nordin et al., 2002), and education for stress-related problems has also been identified in studies of patient education in physical therapy practice (Gahimer & Domholdt, 1996; Sluijs, 1991a). Although not as frequently identified in the literature as other patient education topics for the treatment of low back pain, these sources could have formed the basis for therapist clinicians' responses along with their daily experiences.

Patient education in the "use of devices and equipment" and in "ergonomics/work modifications" were often suggested in the literature. As with other topics, educators

infrequently identified this education. Again, the reasons may have had to do with the nature of how the subject matter for patient education is spread across more than one course. A majority of physical therapists (70%) selected patient education in the use of devices and equipment, while a much lower number (36%) selected education in ergonomics. One reason this may have occurred could have been due to the survey design. The topic of ergonomics/work modification was listed just prior to a new section on the questionnaire, and respondents may not have seen the topic. In fact, this item was left blank by 62% of respondents. Another reason might be that only 52% of survey respondents indicated that facilities or equipment were available for this instruction.

Ergonomics/work modifications would seem to be a topic for which patient education would be likely. The patient example was described as sitting in a standard chair for most of the day. Since chair design has been discussed in the literature as important for the stresses conveyed to the low back (Callaghan & McGill, 2001; Cyriax, 1975; Kottke, 1961; Pope et al., 2002), it seems logical that instruction in the ergonomics of chair design and work environment (for example, desk and computer placement) would have been discussed with the patient. The low response rate of physical therapists and educators on this topic was not anticipated.

A topic for which there was an inconsistency between the literature and study participants was education on a "graded exercise program." Fewer than half of survey respondents selected this education. There are several reasons this may have occurred. Survey respondents' professional education may not have supported it. This is possible, since this topic was not identified from the physical therapist educator interviews. Another reason might be that survey respondents associated the use of a graded exercise

program preferentially for patients with elevated fear-avoidance beliefs. This could also be possible, since a recent study (George et al., 2003) found that a fear-avoidance-based intervention (that included a graded exercise program), as compared to standard care physical therapy, resulted in more disability for patients who did not have elevated fear-avoidance beliefs. A final reason might be that the single research study (Fordyce et al., 1986) that supported this education for patients with acute low back pain is over 20 years old. Physical therapists may not have been aware of this research.

Therapeutic Exercises as a Patient Education Topic

There was a lack of agreement among participants in this study and the literature on the use of therapeutic exercises as a patient education topic. Only one systematic review supported the use of exercises, but the majority of the studies appraised in this systematic review did not match the patient conditions in the current study. Conclusions from other systematic reviews clearly stated that the use of exercises is not helpful for the management of acute, nonspecific low back pain (Hayden et al., 2005; van Tulder et al., 2000) Yet, physical therapists and educators identified education in therapeutic exercises for the patient education program in the current study. One reason this occurred may have been that therapists were unfamiliar with the literature. Also, physical therapists might not regard "nonspecific low back pain" as a homogenous condition (Delitto, 2005). Thus, treatments that are related to this condition could be considered invalid (Delitto, 2005). Instead, research shows that physical therapists base treatment decisions on treatment goals and/or patient evaluation findings (Battie et al., 1994; Dekker et al., 1993; Poitras et al., 2005; van der Valk et al., 1995). This, then, could lead to the choice of using education in therapeutic exercises for the management of a specific low back

condition. The findings from the current study agree with previous research suggesting that a number of physical therapists do not base their treatment decisions for management of low back pain on practice guidelines (Li & Bombardier, 2001).

Patient-Specific Exercises as a Patient Education Topic

Education in exercises to achieve centralization of symptoms (patient-specific directional preference exercises) had a high level of agreement among all three data sources for the patient education program. Although systematic reviews did not support the use of therapeutic exercises for acute, nonspecific low back pain, there were other sources within the literature that suggested the use of patient-specific directional preference exercises (McKenzie & May, 2003; Saunders & Ryan, 2004), or similar exercises (Delitto et al., 1995), for specific sub-groups within the nonspecific low back pain population.. Additionally, recent research supports the use of these exercises over other types of exercises (Long et al., 2004).

The high level of agreement that was found among the three data sources for the use of patient-specific directional preference exercises may have been due to several reasons. One reason may be that the use of the McKenzie approach for mechanical diagnosis and therapy is well known within the physical therapy profession. Seventy percent (70%) of survey respondents identified the textbook, *The Lumbar Spine Mechanical Diagnosis & Therapy,* by Robin McKenzie, as a source of information used in treating patients with low back pain (McKenzie, 1981; McKenzie & May, 2003). Another reason is that the use of these exercises has been linked almost exclusively to the management of the patient conditions in the current study (that is, derangement syndrome) (McKenzie & May, 2003). Thus, these exercises would be considered

specialized for the management of this condition. A third reason is that centralization of symptoms is considered a good prognosticator for the healing of low back pain conditions (Donelson et al., 1990; Sufka et al., 1998; Werneke et al., 1999). Consequently, exercises that promote centralization would be considered beneficial for healing. Additionally, recent research indicates that these exercises are superior to other types of exercises for the management of a derangement syndrome (Long et al., 2004). This research may be the strongest to date supporting the use of these exercises for this condition. Finally, a 2001 survey conducted in Canada found that roughly half of the physical therapists surveyed did not find practice guidelines helpful in determining treatment for low back pain (Li & Bombardier, 2001). As noted previously, physical therapists are likely to base treatment decisions on treatment goals and/or patient evaluation findings (Battie et al., 1994; Dekker et al., 1993; Poitras et al., 2005; van der Valk et al., 1995). Since the evaluation findings (patient conditions) in this case pointed to a derangement syndrome, the use of exercises considered specialized for the management of this condition is consistent with the literature.

The Range of Therapeutic Exercises to be Used for the Patient Education Program

There is a lack of consensus among the data sources in this study regarding the range of therapeutic exercises to be employed for the patient education program. The literature often suggested the use of patient-specific exercises for the management of a derangement syndrome. Additionally, there were other exercises suggested in the literature that were not as prevalent. These exercises were supported for patient conditions similar to those used in the current study, but patients were not classified as

having a derangement syndrome. One of these types of exercises had research support in the form of a single study that supported the use of aerobic capacity/conditioning endurance exercises for patient conditions roughly similar to the current study (Chok et al., 1999). The other type of exercises recommended by the literature was a graded exercise program. These exercises were supported for patients with acute, nonspecific low back pain. This resulted in three main types of exercises being advocated in the literature for use with a derangement syndrome or for patient conditions roughly similar to those described for the current study.

Educators primarily suggested the use of patient-specific exercises, while physical therapists selected multiple types of exercises. In fact, of the 16 types of exercises listed in the survey, 12 of them accounted for 75% or more of therapists' choices for the patient education program. These responses appear to indicate that physical therapists consider multiple types of exercises appropriate for the patient education program. The literature offers some clues as to why this may have occurred.

The Guide to Physical Therapist Practice describes the use of the patient evaluation process to guide the selection of interventions (American Physical Therapy Association, 2001). This process was called the patient/client management process. In their article, "A Physical Therapy Example for the Treatment of Low Back Pain," DeRosa and Porterfield described a similar clinical reasoning process for selecting therapeutic exercises in low back pain management (1992). Delitto et al. (1995) proposed the use of a three-stage process for classifying and treating patients with low back syndrome, in which interventions were directed to the treatment goals of each stage. Researchers have described some of the rationales behind exercise selection. Based on

the patient examination, a specific therapeutic approach or exercises may be selected with the intention of centralizing symptoms (McKenzie & May, 2003), relieving pain (Delitto et al., 1995), restoring function (DeRosa & Porterfield, 1992) or addressing secondary deficits or disability (Fritz & Hicks, 2001).

Two studies were published that illustrate the use of the physical therapy patient/client management process for treatment of low back pain. Of specific interest is the management process for exercise selection. The first of these was a case report on a patient with mechanical low back pain (Brown & Snyder-Mackler, 1999). The focus of the report was the usefulness of a patient classification system in determining appropriate treatment for a patient with acute onset of low back pain. Duration of symptoms was 10 days. The patient's problem was categorized as an extension syndrome, using the classification system developed by Delitto et al. (1995). This classification has features in common with the derangement syndrome described by McKenzie (Delitto et al., 1995). In the case report, the exercise program was initiated with lumbar extension exercises, which helped to relieve pain. In subsequent visits, additional exercises were incorporated to address range of motion and strength deficits. These deficits were identified by the physical therapist on the initial patient evaluation. Treatment took place over a three-week period, and the patient was discharged after eight visits. This case report demonstrated the use of exercises for more than one purpose. The exercise program was centered on the patient assessment, matched to treatment objectives and varied over the episode of care.

In the next study, Fritz (1998) described a similar approach to treatment in a case report of three patients. A classification system (Delitto et al., 1995) was used to classify

patients during the initial evaluation. One patient's problem was categorized as a lateral shift classification, another as an extension classification and the third as a flexion classification. Each patient received exercises consistent with his or her examination findings. Once pain was brought under control (during a time period that varied from four to seven weeks), additional exercises were prescribed by the physical therapist. These additional exercises were intended to address residual deficits identified during the initial evaluation. As with the previous study, this case report described the use of exercises for more than one purpose across the episode of care.

Further support for this management process for exercise selection may be found in a textbook chapter entitled, "Exercise Protocols for Low Back Pain" (Fritz & Hicks, 2001). Three stages are defined for exercises, based on the patient's stage of recovery (determining the stage of recovery was not based solely on symptom duration, but also on the severity of the patient's presentation (Delitto et al., 1995)). The goal of Stage I exercises is to reduce the severity of symptoms. These exercises might include specific exercise routines to promote centralization. The goal of Stage II exercises is to increase patients' activity levels and to decrease the levels of disability. Stage III exercises are used for dynamic stabilization and aerobic fitness/conditioning. The authors concluded that exercises to centralize symptoms would often be used early in the rehabilitation process, while exercises for stabilization and conditioning would be used later.

These articles have shown how the patient/client management process was used to select therapeutic exercises for patients with low back pain. Similar to the treatment approaches described in the literature (Delitto et al., 1995; DeRosa & Porterfield, 1992), the management process can be summarized as follows: 1) the exercises were selected

based on problems/impairments identified at intake and 2) if more than one problem/impairment was present, therapeutic exercises were initially used to manage pain and subsequently used to manage other problems/impairments, such as muscle weakness, range of motion deficits, loss of endurance, *et cetera.*

Descriptive studies of low back pain management in physical therapy practice suggest that this management process is used in current clinical practice. Findings from a recent survey of physical therapists in Canada are that treatment objectives for reducing pain have greater frequency of use in the initial sessions, while improving strength, increasing endurance and improving function have greater frequency of use in later sessions (Poitras et al., 2005). Exercise interventions were found to follow the same pattern. For example, interventions such as the McKenzie approach and posture correction have a greater frequency of use in initial sessions, while strengthening exercise, cardiorespiratory exercise and simulation of work tasks have greater frequency of use in later sessions.

Other studies have reported similar findings. A study by Jette and Delitto (1997) on physical therapy treatment choices for musculoskeletal impairments found that strengthening and endurance exercises were increasingly used in the latter part of the episode of care for lumbar impairments.

These findings suggest that physical therapists in the current study may have selected a multitude of exercises with the expectation that treatment goals would vary across the two weeks of care. In this sense, the current study's findings are consistent with the literature regarding the use of a range of therapeutic exercises in the management of low back conditions.

Teaching Methods

There was a high level of agreement among study participants and the literature with regard to the use of individual training for instruction of therapeutic exercises. Research supported this teaching method over other methods (Hagins et al., 1999; Reo & Mercer, 2004). Physical therapists and educators predominantly used this method in comparison to other methods. This finding could indicate that study participants are aware of the literature findings. It could also indicate that their practical experience taught them that this was the best approach for learning (as the research indicates). There is also theoretical support for the use of individual training (which may include a demonstration component), in that observation appears to be a strong stimulus to learning (Bandura, 1977b). Finally, the individual training approach also includes a component that could be used to give the learner feedback (the patient practices performing the learned behavior under the supervision of the physical therapist). Feedback on progress is a feature considered necessary for patients' ability to adhere to the therapeutic regimen (Mullen et al., 1992).

Often, study participants suggested the use of individual training with other teaching methods, such as verbal instruction or individualized handouts. The use of multiple teaching methods agrees with previous research findings for physical therapy practice (Laitakari et al., 1997) and with professional opinion regarding optimal teaching methods (Nordin et al., 2002).

Although the literature supported the use of videotape modeling for instruction of exercises (Reo & Mercer, 2004; Weeks et al., 2002), this method was rarely used by practitioners or suggested by educators. Some of the reasons this occurred might have

been due to a lack of equipment. Sixty-three percent (63%) of survey respondents indicated that computer or video programs (including back schools) were not available to them for patient education.

The literature also supported the use of individualized handouts to supplement verbal instruction for exercises (Schneiders et al., 1998). Practitioners and educators agreed on the use of this teaching method as well. The reason this occurred might have had to do with either study participants' awareness of research findings or their practical experience. It is also possible patients influenced physical therapists to provide a handout to supplement verbal instructions.

The use of pre-published material for patient education did not figure large among the teaching methods advocated by physical therapists or educators. When pre-published material was used, it was usually in conjunction with other methods. Research indicates that pre-published material is effective when used for education in the "self-limiting nature of low back pain and the importance of resuming normal activities" (Burton et al., 1999; Little et al., 2001; Roberts et al., 2002). Educators did not identify this topic, so teaching methods are not available from this data source. Physical therapists did select this topic, but only 13% of respondents selected pre-published material as a teaching method. When selected, pre-published material was used in conjunction with other methods.

This disparity between the literature and the study participants is not likely to be due to the lack of pre-published material, since several brochures are available. However, some of the research supporting the use of these brochures was done in England, and American physical therapist clinicians may not be aware of these studies.

Implications

The findings from this study suggest that the "patient example" approach to this research was useful. Feedback from physical therapy clinicians led to a progression in how the survey instrument was developed, and concluded with the use of specific patient conditions and a diagnostic classification. These features may be useful for applying the findings of this study to clinical practice. They also illustrate some of the factors that may be considered important in developing the patient education program.

The findings and conclusions of this study suggest that it would be valuable for physical therapists and physical therapy educators to examine the content and methods they currently employ or suggest to physical therapy students for delivering the patient education program for an acute low back derangement syndrome.

The patient education program proposed by physical therapy educators is at variance with research and practices that are working for physical therapists. This suggests educators should communicate with each other and with physical therapists in the field in order to develop a consistent and mutually agreed upon curriculum for the patient education program.

There were a number of additional topics that were suggested in the literature. These topics were generally not supported by all three data sources; however, there could be reasons that these topics might still be important to consider for the patient education program. The educational literature suggests a number of practices that may be beneficial for the patient education program. These include addressing patients' fears or misconceptions and promoting self-care. Education on the self-limiting nature of low back pain, the role of imaging studies, the signs and symptoms of complications and self-

management strategies could all be features important to include for the patient education program.

The patient education program suggested by this research study was limited to the patient conditions and parameters proposed by this study. Additional patient education topics could be supported if additional patient conditions/parameters were known to be present. For instance, core stabilization exercises (specific to the transversus abdominis and multifidus muscles) and a specific home exercise program are supported by the literature if muscle impairments are present. General stretching/strengthening/aerobic exercises with a cognitive-behavioral component are supported by the literature for the subacute phase of care.

Finally, there may be components of the patient education program that are currently used, but unnecessary for effective practice. The lack of research specific to patient education for a derangement syndrome indicates that further knowledge would be helpful in this area. The disparities among the study findings suggest that the patient education program for a low back derangement syndrome is not fully defined at this time.

Implications for Physical Therapists

The physical therapist survey responses show that much of their practice in patient education is consistent with professional practice standards and with research findings. However, much of this research is based on non-specific low back pain, and professional practice standards are consensus-based. These findings suggest that continued review of practice standards would be beneficial, as would an on-going review of the literature as futher knowledge is gained for the management of a low back derangement syndrome

Physical therapists' practices included a number of additional topics for the patient education program. Is it possible some of this education is unnecessary? For instance, physical therapists included education on the self-limiting nature of low back pain and the importance of resuming normal activities. Is it possible this education may be counter-productive for a patient with low fear-avoidance beliefs, as the literature suggests?

Physical therapists included a wide range of exercises for the patient education program. Was this done because therapists believed some or all of these exercises might be necessary in the latter part of rehabilitation? Or, did therapists believe a wide variety of exercises were needed right from the beginning? The design of the study does not permit answers to these questions. However, these survey responses imply that physical therapists use exercises to treat a multitude of problems. Research has shown that patient-specific exercises concordant with the patient's directional preference are superior to exercises opposite the directional preference, and also superior to multidirectional exercises. The implication for physical therapists may be for them to preferentially use patient-specific exercises. Yet, since physical therapists often must balance research findings with the individual needs of the patient, comparing research findings with clinical outcomes may help to provide further answers.

Implications for Physical Therapy Educators

Although a significant number of educators identified some of the patient education topics suggested by the literature and the practices of physical therapists, in many cases this was clearly not a majority. If the subject matter of patient education is spread across more than one course in the professional curriculum, then educators could

focus their efforts on defining those components felt to be important for the patient education program. It is possible that some components would be standard for most types of patient conditions. Greater clarity in identifying these standard components and how the patient education program might differ for individual conditions would be beneficial for student instruction.

Currently, educators do not identify many of the topics used by practicing physical therapists for management of a low back derangement syndrome. One possible implication of this finding is that recent graduates are not prepared to offer the same patient education program as seasoned clinicians. Another implication could be that recent graduates are prepared, but individual faculty members are unaware of all the components of the patient education program. This could be a shortcoming of the professional education program, if there are areas in which further benefit to students could be realized.

Recommendations for Future Research

Future research should continue to examine the question, "What are the optimal components of a patient education program for a low back derangement syndrome?" This study was unable to answer this question. While some content/topics and teaching methods were supported by research, there were many other topics/methods identified by this study in literature and in practice that were not evaluated through research studies. Also, research findings for some educational topics were inconclusive.

Another research question might focus on patients' perspectives on the patient education program: "What components do patients perceive as important?"

The patient education program suggested by this research was related to a specific patient example. Future questions could include, "How might this program differ for other patient conditions?" Or, "To what extent was the patient education program in the current study individualized for the patient example?"

For many of the patient education topics identified by the current study, the optimal teaching methods are not known. Further research in this area would be beneficial. For instance, are there some topics that could easily be covered by pre-published material in print or on the Internet, thus saving the physical therapist time for individual training for other topics?

Future research questions in the area of physical therapy patient education could include: "Does collaboration in setting goals lead to better outcomes in care?" Or, "What are the factors important in promoting behavior changes for physical therapy patients?" Other questions might include, "What are the optimal teaching methods for the patient education topics identified by professional practice standards?" Or, "What are the factors that could improve learning outcomes for teaching methods?"

Finally, further research specific to the use of exercises for a derangement syndrome would be helpful. One study has shown that patient-specific exercises concordant with the directional preference are beneficial in comparison to nonconcordant exercises and advice (Long et al., 2004). No studies have been found that assessed the use of these exercises in comparison to specific stabilizing exercises (core stabilization exercises), or to a control non-exercise group. Research on these and many other questions could help to improve physical therapy patient education programs.

Recommendations for Physical Therapy Educators

There were several topics well described in the literature, yet infrequently identified by educators. Some of these topics could be important for the patient education program and could represent subject areas that could be further developed in physical therapy professional education programs.

There is a substantial body of knowledge regarding how adult learners learn best. Setting a climate of collaboration and mutual respect is advocated in the teaching process design for androgogy. This theory stresses the importance of involving learners in developing learning objectives and designing the learning plans. An implication of the current research is that a collaborative approach to setting treatment goals is used in physical therapy practice, yet not frequently taught in the professional curriculum. This is perhaps an area that could be expanded upon in physical therapy professional education.

Another area that could be expanded upon is the use of concepts from adult learning theory and research. While a number of educators identified these concepts, an implication of the current research is that these concepts are not integrated throughout the curriculum. Reinforcement of this content throughout the curriculum may be helpful for students in adapting this information for clinical practice.

Recommendations for Physical Therapists

Physical therapists may benefit from comparing their clinical outcomes with research findings. This comparison would allow physical therapists to estimate how effective their treatment programs (that are individualized for patients) are in comparison to research protocols.

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Appendices

Appendix A

Physical Therapist Informed Consent Letter
Patient Example
Physical Therapist Questionnaire

October 12, 2005

Ute H. Breese, PT, M.Ed., OCS
East Tennessee State University
Department of Physical Therapy
P.O. Box 70624
Johnson City, Tennessee 37614-0624

Dear Physical Therapy Colleague,

I am a licensed physical therapist and faculty member in a Doctor of Physical Therapy degree program. As an Assistant Professor, I help teach the musculoskeletal courses and assist the Academic Coordinator of Clinical Education in evaluating clinical learning experiences. My back ground includes being a Board Certified Specialist in Orthopaedic Physical Therapy (OCS), and I have taken graduate courses in research and survey design. I am conducting a survey of physical therapists in the United States. This research is being conducted in partial fulfillment of the requirements for my doctoral dissertation, "Physical Therapy Patient Education for the Management of a Low Back Derangement Syndrome." In addition to this survey, other portions of the research study will include a literature review and interview of faculty in physical therapy education programs.

The purpose of this research is to identify the content and design of physical therapy patient education programs for the management of a low back derangement syndrome. The results from this study will benefit the physical therapy profession. Increased information on physical therapy practice will help physical therapy professionals contribute to policy decisions on health care. Additionally, this knowledge will assist physical therapists in developing and designing educational plans and incorporating these interventions in the plan of care. Finally, information from this study will enable patients to receive optimal, consistent, and current information for the self-care of their condition.

Completion of the questionnaire should take about twenty to twenty-five minutes of your time. You will be given a patient scenario, and asked to describe the instructions you would give the patient over the usual course of care.

Your identity will be kept confidential. You may withdraw from the study at any time without penalty. The code on the postcard will only be used to record the return of your questionnaire. Your return of the completed questionnaire constitutes your informed consent to participate in this study.

Although your participation in this research is voluntary, your input is important! Please complete and return the questionnaire in the enclosed, self-addressed, stamped envelope by October 27, 2005. Should you have any questions, please contact me at 423 439-8794.

Thank you for your assistance with this study! For your convenience in completing this questionnaire, a step-by-step list of directions is provided below.

Sincerely yours,

Ute H. Breese, PT, M.Ed., OCS
Assistant Professor,
ETSU Physical Therapy Program

Steps for Completing this Questionnaire:

1. Read the patient example and definitions (blue sheet)
2. Complete Sections 1-4 on the questionnaire (pages 1, 2, & 3)
3. Mail the completed questionnaire (pages 1, 2, & 3) back to the study author using the self-addressed stamped envelope.
4. Mail the self-addressed stamped postcard back to the study author (return of this postcard will allow the study author to remove your name and address from the mailing list).

Physical Therapist Patient Education Survey

Patient Example of a Low Back Pain Condition: Derangement Syndrome[1]

Please review the following patient example and answer the questions on the attached survey. Definitions for abbreviations and terminology are provided on the reverse side of this page.

Patient Example - Low back pain classification category: ***Derangement syndrome[1]***

Patient: Dan, a 32 year-old male, employed as an accountant.

History

The patient sustained sudden onset of low back and right lower extremity (RLE) pain ***one week ago*** following a forward bending lifting movement. Condition status has remained the same since onset. Current symptoms include pain located in the ***right lumbosacral region and right posterolateral hip and thigh*** pain to the knee level. Pain in the low back and RLE is ***intermittent***, and ***exacerbated by*** slouched sitting postures, and lifting/forward bending movements in the sagittal plane. ***Pain is decreased*** with rest in recumbent postures (with neutral spine positioning), walking, or with the use of pain medications. ***Pain rating: 0-2/10 at rest; increases to 7/10*** at the end of the workday.

At his workplace, Dan spends ***most of his day seated at his desk in a standard chair***. He usually takes one ten-minute break in the morning and the same in the afternoon. Lunch is taken at his desk. Dan lives in a two-story home with his wife and two children, ages one and three. Outside of work, Dan's ***activities include grocery shopping, household chores, yard work, and taking care of his children***. In the evening, Dan usually watches television or reads while sitting on the sofa. Pain prevents Dan from playing tennis.

Prior to injury, Dan was able to perform all ADL and IADL, including playing tennis, without pain or restriction. Medical and surgical ***history is negative***, and the presence of ***'red flags', or non-organic signs of illness are not present***. Dan has low fear-avoidance beliefs. Etiology of pain is ***non-specific*** (indicating the presence of serious or known pathology has been ruled out). Dan ***does not have any learning or physical disabilities that would require special learning needs.*** Dan's personal goals for physical therapy are to resume his normal level of activity and to return to playing tennis.

Oswestry score = 40% (Oswestry Low Back Pain Disability Questionnaire, Fairbank et al, 1980: Scores of 20%-40% correspond to moderate disability, in which individuals have difficulty with sitting, lifting, and standing, as well as travel and social life).

Physical Exam

Inspection: standing posture is without spinal deformity; but the ***normal lumbar lordosis is decreased***, the normal thoracic curve is decreased ***(flat back posture)***, the abdominal muscles are lax, and the shoulders are rounded.

Function: lumbar spine active range of motion (ROM) is moderately restricted (patient's ROM is half of the normal expected range), with greatest restriction being present in lumbar spine extension and right side bending movements.

Symptom response to repeated movements: Centralization of pain symptoms occurs with lumbar spine extension movements, while ***flexion movements cause peripheralization*** of pain.

Neurological screen: straight leg raise test (SLR): left = 80°, right = 50°, with right SLR reproducing pain symptoms felt distally along right posterolateral thigh to the knee level, and exacerbated by provocative maneuvers of cervical spine flexion and right ankle dorsiflexion. ***Dermatomes:*** the patient complains of paresthesia along right posterolateral thigh. ***Myotomes:*** within normal limits, bilaterally. ***Deep tendon reflexes (patellar, achilles):*** +2 (normal), bilaterally.

Palpation: the patient reports tenderness to palpation of the spine at levels L4-S1 and the musculature of the right lumbosacral region.
Peripheral Joint Scanning Exam: negative for involvement of joints such as the hip or sacroiliac.
Special tests: radiographs are negative for signs of pathology.

[1] **Derangement syndrome:** The conceptual model for the derangement syndrome "involves internal articular displacement that causes a disturbance in the joint, which produces pain and impairment." (McKenzie & May, 2003). The conceptual model relates presentation of the derangement syndrome to internal intervertebral disc displacements. (McKenzie, 1981, McKenzie & May, 2003)

- This form does not need to be returned with the survey -

Abbreviations and Definitions (as used in this study)

ADL and IADL: activities of daily living (bathing, dressing, eating, etc.); and instrumental activities of daily living (household chores, yard work, shopping, caring for dependents, etc.)
Body mechanics: "The interrelationships of the muscles and joints as they maintain or adjust posture in response to forces placed on or generated by the body."(Guide to Physical Therapist Practice, American Physical Therapy Association, 2001)
Devices/equipment (adaptive, assistive, orthotic, protective, and supportive): These items may include lumbar rolls, static and dynamic splints, canes, crutches, walkers, corsets, elastic wraps, supportive taping, environmental controls, seating systems, etc.
Graded exercise program: an exercise program that may be used as part of a fear-avoidance-based intervention. The exercise is pre-determined for intensity, duration, or repetition. Patients are given positive reinforcement for completing the established quota. Factors such as pain are not intended to serve as a guideline for exercise progression.
Non-organic signs: a group of physical signs in a low back pain screening examination that may help identify the presence of behavioral or psychological factors that can affect a patient's recovery from a low back problem.
Pain rating: a self-report of perceived pain using a visual analog scale, with a score of 0 corresponding to 'no pain' and 10 corresponding to 'unbearable pain.'
Patient care team: a team that provides services to individual patients. The team consists of the physical therapist and individuals who work under the therapist's supervision in providing patient care services.
Patient education or patient instructions: the instruction, education, and training of patients/clients and caregivers regarding current condition; enhancement of performance; health, wellness, and fitness programs; plan of care; risk factors for pathology/pathophysiology; transitions across settings; and transitions to new roles (Guide to Physical Therapist Practice, American Physical Therapy Association, 2001)
Physical therapist: this term can mean the physical therapist or individuals who work under the physical therapist's supervision as part of the patient care team.
Red flags: signs or symptoms in the history/physical exam suggestive of the presence of medical disease.

Definitions of Teaching Methods/Resources

V Verbal Instruction: The physical therapist verbally instructs the patient/client in the content, technique or procedure. Instructions may be augmented by the use of charts, graphs, pictures, or anatomical models.

H/O Individualized Handout: The physical therapist provides the patient/client with a written handout to take home. The handout is *individualized* and may include text, sketches, or photographs. The physical therapist customizes the handout specifically for the individual patient/client using a computer program or educational materials.

PM Pre-Published Material: The physical therapist provides the patient/client with pre-published material to take home or access on the computer. The handout is *not individualized* for the patient/client, but is an 'off the shelf' instructional sheet, pamphlet, booklet, or internet resource. Pre-published material may be produced by the physical therapist or an outside resource.

C/V Computer or Video Program: The physical therapist requests the patient/client to view a computer or video program in the clinic or at home. The computer or video program is *not individualized* for the patient/client.

IT Individual Training: The physical therapist instructs or demonstrates the desired learning behavior for the patient/client in an *individual training session.* The patient practices performing the behavior under the supervision of the physical therapist.

- This form does not need to be returned with the survey -

Physical Therapist Patient Education Survey

Section 1: Provision of Patient Education

A. On average, for how many patient visits do you (or your patient care team) provide individual services **each week?**
Please specify the number of treatments per week by placing a checkmark on the appropriate line:

Treatments per week: ___ 1-10 ___ 11-20 ___ 21-30 ___ 31-40 ___ 41-50 ___ 50+
___ I (or my patient care team) do not provide direct services to patients (please skip to Section 2)

B. Please indicate the amount of time that is *usually* available to you (or your patient care team) per patient visit for patient education, including the instructions that normally accompany interventions such as therapeutic exercises or functional training. Please place a checkmark in the appropriate box:

☐ No time (0 minutes) ☐ 1-5 minutes ☐ 6-10 minutes ☐ 11-15 minutes ☐ 16-20 minutes ☐ Unlimited time (> 20 minutes)

C. If you are able to provide patient education, which of the following methods/resources (please refer to the blue sheet) are available to you or the patient? Please check the box in the appropriate column for each item listed.

Method or Resource	Available	Not Avail.
1. Verbal instruction		
2. Charts or graphs		
3. Anatomical models		
4. Photographs		
5. Copy machine to produce individualized handouts		
6. Computer/printer to produce individualized handouts		
7. Pre-published handouts or pamphlets (non-individualized)		
8. Pre-published internet resources (non-individualized)		
9. Computer or video program (including 'back school')		
10. Facilities/equipment for demo/instruction of therapeutic exercises	----------	----------
a. treatment or mat table		
b. equipment for aerobic exercises		
c. equipment for progressive resistive exercises		
d. therapeutic pool for aquatic exercises		

Method or Resource	Available	Not Avail.
11. Facilities/equipment for instruction in materials handling (lifting, carrying, etc.)		
12. Facilities/equipment for use of physical agents		
13. Facilities/equipment for simulation of, or actual, environment for instruction in ADL/IADL	----------	----------
a. home		
b. work		
c. community		
14. Devices/equipment (definitions of devices/equipment are available on blue sheet)	----------	----------
a. please specify:		
b. please specify:		
c. please specify:		
15. Other; please describe:		
16. Other; please describe:		

Section 2: Patient Instructions

A. As you complete this section, please refer to the Patient Example and definitions (blue sheet).
- Read the list of patient instruction topics below. The list is designed to correspond to the factors a physical therapist might consider in developing a patient education program.
- If you were to provide the instruction for the given patient example, please indicate your *usual or recommended* teaching method(s) by checking the appropriate box (teaching methods are defined on the blue sheet).
- You may mark more than one method if methods are used concurrently.
- If you **would not** provide instruction on a particular topic listed below, please check the N/A box.

*Note: The instructions should be those that you would normally provide **over the initial two weeks of care**, given that Dan's condition responds to physical therapy interventions and demonstrates normal signs of healing over the next four to six weeks.*

Legend

N/A = Not Applicable	**V** = Verbal Instruction
H/O = Individualized Handout	**PM** = Pre-Published Material
C/V = Computer or Video Program	**IT** = Individual Training

Instructions	**Teaching Methods**					
Instruction: General Information	**N/A**	**V**	**H/O**	**PM**	**C/V**	**IT**
1. Current condition and risk factors for its development						
2. Self-limiting nature of low back pain and the importance of resuming normal activities (fear avoidance-based patient education)						
3. Plan of care (physical therapist educates patient regarding management plan)						
4. Importance of patient participation in setting management goals						
4. Health, wellness, and fitness						
5. Resuming patient's personal goal of playing tennis						
6. Use of physical agents to control pain						
7. Use of devices/equipment (before answering this question, please see the definition on the blue sheet) a. Please specify: _____ b. Please specify: _____ c. Please specify:						

Legend

N/A = Not Applicable	**V** = Verbal Instruction
H/O = Individualized Handout	**PM** = Pre-Published Material
C/V = Computer or Video Program	**IT** = Individual Training

Instruction: General Information	**N/A**	**V**	**H/O**	**PM**	**C/V**	**IT**
8. Use of rest periods during activities						
9. Altering the rate or pace of performing activities						
10. Altering the amount of loads/forces acting on the lumbar spine						
11. Role of imaging studies and specialty referrals						
12. Stress management						

Instruction: Posture, Body Mechanics, and Ergonomics	**N/A**	**V**	**H/O**	**PM**	**C/V**	**IT**
13. **Patient positioning**	------	------	------	------	------	------
a. for static postures						
b. for dynamic postures						
14. **Body mechanics**	------	------	------	------	------	------
a. for ADL						
b. for IADL						
c. for lifting						
15. **Ergonomics instruction**						

Legend

N/A = Not Applicable	**V** = Verbal Instruction
H/O = Individualized Handout	**PM** = Pre-Published Material
C/V = Computer or Video Program	**IT** = Individual Training

Instruction: Exercise	**N/A**	**V**	**H/O**	**PM**	**C/V**	**IT**
16. **Therapeutic exercises**	------	----	------	------	------	------
o. aerobic capacity/conditioning endurance or reconditioning						
b. balance, coordination, and agility						
c. postural						
d. gait and locomotion						
e. relaxation and breathing						
f. aquatic						
o. exercises designed to achieve centralization of symptoms						
h. exercises designed to decrease pain						
i. strengthening	------	----	------	------	------	------
1. back						
2. leg						
3. abdomen						
j. range of motion	------	----	------	------	------	------
1. back						
2. leg						
3. abdomen						
k. neural tissue gliding						
l. spinal flexion exercises						
m. spinal extension exercises						
o. spine stabilization						
p. core stabilization exercises (specific for transversus abdominis and multifidus muscles)						

Legend

N/A = Not Applicable	**V** = Verbal Instruction
H/O = Individualized Handout	**PM** = Pre-Published Material
C/V = Computer or Video Program	**IT** = Individual Training

Instruction: Exercise	**N/A**	**V**	**H/O**	**PM**	**C/V**	**IT**
q. graded exercise program (before answering this question, please see the definition on the blue sheet)						
r. other: please describe:						

Instruction: Other; please describe	**N/A**	**V**	**H/O**	**PM**	**C/V**	**IT**
17.						
18.						
19.						
20.						

Section 3: Resources

A. This part of the survey asks you to identify textbooks, educational materials, or continuing education courses that have provided helpful information/practices you currently use in treating patients with low back pain. This information is intended to provide the survey author with a list of resources that have contributed to the development of the patient education programs. Please check each item that applies.

1. Textbooks or other educational materials

____ *Orthopaedic Physical Assessment,* David J. Magee

____ *The Lumbar Spine Mechanical Diagnosis & Therapy,* R. McKenzie

____ *Management of Common Musculoskeletal Disorders,* D. Hertling & R. M. Kessler, eds.

____ *The Spine. Evaluation, Treatment & Prevention of Musculoskeletal Disorders, Vol.1,* H. Duane Saunders

____ *Diagnosis and Treatment of Movement Impairment Syndromes,* Shirley Sahrmann

____ *Techniques in Musculoskeletal Rehabilitation,* W.E. Prentice & M.L. Voight, eds.

____ *Orthopaedic and Sports Physical Therapy,* J.A. Gould III, ed.

____ *Orthopaedic Physical Therapy,* R.A. Donatelli & M.J. Wooden, eds.

____ *Clinical Orthopaedic Physical Therapy,* J.K. Richardson & Z.A. Iglarsh, eds.

____ *Other; please describe:* _____

2. Continuing Education Programs

____ Manual Therapy & Orthopaedic Seminars, University of St. Augustine, Stanley Paris, PT, PhD, FAPTA

____ Functional Orthopaedics, University of St. Augustine

____ Mechanical Diagnosis and Therapy, The McKenzie Method, Robin McKenzie, CNZM, OBE, FCSP (Hon), FNZSP (Hon), Dip MT

____ Somatic Education, The Feldenkrais Method, Moshe Feldenkrais, D.Sc.

____ Low Back and Pelvic Pain, Janet G. Travell, MD, Seminar Series

____ Advanced Diagnosis & Treatment for Neck & Back Pain, American Back Society

____Orthopaedic Manual Physical Therapy, North American Institute of Orthopaedic Manual Therapy (NAIOMT)

____ Manual Therapy, The Mulligan Concept, Brian Mulligan, FNZSP, Dip MT

____ Myofascial Release, John F. Barnes, PT

____ Orthopaedic Manual Therapy, The Maitland Concept, Geoffrey Maitland, MBE, AUA, FCSP, FACP, MAppSc

____ Institute of Orthopaedic Manual Therapy, Kaltenborn-Evjenth Concept, Freddy Kaltenborn, PT, OMT & Olaf Evjenth, PT, OMT

____ Diagnosis & Treatment of Movement Impairment Syndromes, Shirley Sahrmann, PT, PhD, FAPTA

____ Mobilisation of the Nervous System, David Butler, M App Sc, GDAMT, B Physiotherapy

____Therapeutic Exercises for Spinal Segmental Stabilization, Carolyn Richardson, BPhty (Hons), PhD; Gwendolen Jull, Dip Phty, GDAMT, MPhty, PhD, FACP; Paul Hodges, BPhty (Hons), MedDr, PhD; Julie Hides, BPhty, MPhtySt, PhD

____ Other; please describe: _____

Section 4: Demographics

A. Please complete the following:

____ male
____ female

____ age 20-24
____ age 25-29
____ age 30-34
____ age 35-39
____ age 40-44
____ age45-49
____ age 50-54
____ age 55-59
____ age 60-64
____age 65

B. Which of the following **professional physical therapy** degree/certificate programs have you completed? (check all that apply)

_____ Baccalaureate
_____ Postbaccalaureate Certificate
_____ Master's
_____ Doctorate in Physical Therapy
_____ Other; please list: _____

C. What is your **primary** practice setting (the setting in which you practice more than half the time – please check only one)

_____ Private outpatient office or group practice
_____ Health system or hospital-based outpatient facility or clinic
_____ Acute care hospital
_____ Patient's home/home care
_____ Skilled Nursing Facility/Emergent Care Facility/Intensive Care Facility
_____ School system (preschool, primary, secondary)
_____ Academic institution (postsecondary)
_____ Sub-acute rehabilitation hospital (in-patient)
_____ Industry
_____ Health and wellness facility
_____ Research center
_____ Other (please specify) _____

D. Which of the following best describes your model of practice for delivery of patient care services?

_____ I provide patient care **with** the assistance of a physical therapist assistant or support personnel
_____ I provide patient care **without** the assistance of a physical therapist assistant or support personnel

E. In addition to the services which you provide, do your patients receive services from other health care professionals at your facility (such as occupational therapists, psychologists, etc)?

_____ No
_____ Yes; please describe: _____

F. What is the type of your work employment?

_____ Full-time
_____ Part-time (please specify number of hours worked per week: _____

E. What is the total number of years you have practiced physical therapy?

_____ 0-5 years
_____ 6-10 years
_____ 11-15 years
_____ 16-20 years
_____ 21-25 years
_____ 26+ years

F. What American Board of Physical Therapy Specialties Certifications do you have? (check all that apply)

_____ None
_____ Cardiovascular and Pulmonary Certified Specialist (CCS)
_____ Electrophysiologic Certified Specialist (ECS)
_____ Pediatric Certified Specialist (PCS)
_____ Geriatric Certified Specialist (GCS)
_____ Neurologic Certified Specialist (NCS)
_____ Orthopaedic Certified Specialist (OCS)
_____ Sports Certified Specialist (SCS)

H. What other types of advanced certifications do you have?

_____ None
_____ McKenzie Certification
_____ Conditioning and Sports Certification
_____APTA Credentialed Clinical Instructor
_____ Manual Therapy Certification; please specify: _____
_____ Other (please specify) _____

Thank you for taking the time to complete this questionnaire! Please indicate any comments you may have related to this survey:

_____
_____
_____
_____

Appendix B

Program Administrator Informed Consent Letter
Program Administrator Data Collection Form

April 24, 2006

Ute H. Breese, PT, M.Ed., OCS
East Tennessee State University
Department of Physical Therapy
P.O. Box 70624
Johnson City, Tennessee 37614-0624

Dear Program Administrator,

I am a licensed physical therapist and faculty member in a Doctor of Physical Therapy Degree Program at East Tennessee State University. I am an Assistant Professor and assist with teaching in the musculoskeletal portion of the program. My background includes being a Board Certified Specialist in Orthopaedic Physical Therapy, and I have taken graduate courses in qualitative research design. I am conducting interviews of physical therapy faculty in selected professional degree programs throughout the United States. This research is being performed in partial fulfillment of the requirements for my doctoral dissertation, "Physical Therapy Patient Education for the Management of a Low Back Derangement Syndrome."

The purpose of this research is to identify the content and design of physical therapy patient education programs for the management of a low back derangement syndrome. The results from this study will benefit the physical therapy profession. Increased information on physical therapy practice will help physical therapy professionals contribute to policy decisions on health care. Additionally, this knowledge will assist physical therapists in developing and designing educational plans and incorporating these interventions in the plan of care. Finally, information from this study will enable patients to receive optimal, consistent, and current information for the self-care of their condition.

I would like to speak with faculty who are involved in teaching students about patient education. Faculty will be asked to describe their instruction of physical therapy students regarding the content and design of patient education programs for low back pain. The interview should take approximately twenty to twenty-five minutes of the faculty member's time. Faculty will be contacted by email or telephone, and will be sent an introductory letter. After obtaining their informed consent, an interview date will be set.

I realize that this task may involve more than one faculty member. Also, if your program is similar to ours, we have just developed a new course called Teaching and Learning in Physical Therapy, for which the teaching activities have not yet been developed. A situation such as this would not be considered a barrier to participation, but would be included in a description of what is being taught to students.

In addition to providing the names of the faculty who can assist with this study, I would like to ask you a few questions related to your program (the questions are listed on the next page). Answering these questions should take approximately five to ten minutes of your time. You may email your responses if desired, or I will contact you by telephone within the next few days.

Your identity, the identity of faculty, and the identity of your institution will remain confidential. Your participation in answering the questions constitutes your informed consent to contribute to this study. You may withdraw from the study at any time without penalty. Should you have any questions, please contact me at 423 439-8794. Although your participation is voluntary, your contribution is important! Thank you for your assistance – it is very much appreciated.

Sincerely yours,

Ute H. Breese, PT, M.Ed., OCS
Assistant Professor
ETSU Department of Physical Therapy

Questions for Program Administrators (You may email your responses if desired, or I will contact you by telephone within the next few days).

5. Does your program cover the topic of patient education in more than one course? If so, what are the names of these courses (relative to instruction of patients with low back pain)?

6. Does the current curriculum (in the area of patient education) represent a change over the past five years? If so, why did these changes occur?

7. What type of physical therapy degree(s) are offered at your institution?

8. What is the class size at your institution?

Appendix C

Physical Therapist Educator Informed Consent Letter
Physical Therapist Educator Interview Guide

April 24, 2006

Ute H. Breese, PT, M.Ed., OCS
East Tennessee State University
Department of Physical Therapy
P.O. Box 70624
Johnson City, Tennessee 37614-0624

Dear Physical Therapy Colleague,

I am a licensed physical therapist and faculty member in a Doctor of Physical Therapy degree program. As an Assistant Professor, I help teach the musculoskeletal courses and assist the Academic Coordinator of Clinical Education in evaluating clinical learning experiences. My background includes graduate courses in research and survey design, as well as being a Board Certified Specialist in Orthopaedic Physical Therapy (OCS). I am conducting an interview of physical therapy educators from selected professional educational programs in the United States. This research is being conducted in partial fulfillment of the requirements for my doctoral dissertation, "Physical Therapy Patient Education for the Management of a Low Back Derangement Syndrome." In addition to this interview, other portions of the research study will include a literature review and a survey of physical therapists in the United States.

The purpose of this research is to identify the content and design of physical therapy patient education programs for the management of a low back derangement syndrome. The results from this study will benefit the physical therapy profession. Increased information on physical therapy practice will help physical therapy professionals contribute to policy decisions on health care. Additionally, this knowledge will assist physical therapists in developing and designing educational plans and incorporating these interventions in the plan of care. Finally, information from this study will enable patients to receive optimal, consistent, and current information for the self-care of their condition.

The interview should take approximately twenty to twenty-five minutes of your time. You will be asked to describe your instruction of physical therapy students regarding patient education for low back pain.

Your identity and the identity of your institution will remain confidential. Your participation in setting an interview date and time constitutes your informed consent to participate in this study. You may withdraw from the study at any time without penalty.

Although your participation is voluntary, your input is important! Please read the patient example and definitions (included as an attachment or to be emailed after the interview date is set), and I will contact you for the interview on the designated date. Should you have any questions, please contact me at 423 439-8794.

Thank you for your assistance with this study!

Sincerely yours,

Ute H. Breese, PT, M.Ed., OCS
Assistant Professor
ETSU Department of Physical Therapy

Physical Therapist Educator Interview

Recently, I sent you a patient scenario involving low back pain, and established a time for this interview. As you know from the materials I sent, the focus of the interview is instruction of physical therapy students in your program regarding patient education. I realize that more than one faculty member may be involved in teaching students about patient education; however, you have been contacted because your teaching area includes some of this instruction.

As you respond to the questions I'm going to ask, please consider how you would instruct students to provide patient education for the example I sent you. If your instruction is not individualized for the given patient example, there will be an opportunity at the start of the interview to discuss this.

While your responses will be used in my study, neither you nor your institution will be identified.

The initial questions for this interview will focus on your role in providing student instruction.

9. What professional physical therapy degree/certificate programs have you completed? When were they completed?

10. Please identify any American Board of Physical Therapy Specialties Certifications or other types of advanced certifications you may hold:

11. What is your job title?

12. How long have you held your current position?

13. Related to instruction of physical therapy students in providing patient education, a) what are your teaching areas, and b) what are the titles of the courses involved?

14. Have you had a chance to read the patient example and definitions? (If not, we'll postpone the interview until you've had a chance to read it).

15. Does your instruction (of students for patient education) allow for a focus on the patient example given? (if not, please go on to question #8)

16. Does your instruction (of students for patient education) allow for a focus on low back pain?

The rest of the questions in this interview will focus on how students are instructed in the resources, content, and methods for patient education. Please respond to the questions in the context of the patient example (if your instruction is not individualized to the patient example, please answer the questions according to the general instruction you give students in the area of patient education).

17. How much time do you recommend that a physical therapist should spend on patient education during a visit?

18. Are there any teaching tools you recommend to students for their use in instructing patients? If so, what are they?

19. What types of things do you encourage students to cover when educating patients regarding low back pain?

20. You have mentioned several types of things that you encourage your students to cover in patient education. As I read them back to you, can you tell me what methods of instruction you recommend in each area?

21. In addition to any resources you have already mentioned, are there other educational resources you recommend to students for developing or delivering patient education programs? If so, what are they?

22. What are the textbooks or other educational materials pertaining to patient education that you use in your courses?

Appendix D

Checklist for Educational Materials

Checklist for Educational Materials

Source: _____

Diagnosis: _____

Topic	Comments	Delivery Methods
Time for patient education		
Condition/risk factors		
Self-limiting nature of LBP		
Plan of Care		
Patient participation		
Wellness		
Personal goal		
Pain control		
Devices and equipment		
Rest periods		
Pace of activities		
Amount of loads		
Role of imaging		
Stress		
Positioning - static postures		
Positioning - dynamic		
Body mechanics for ADL		
Body mechanics for IADL		
Body mechanics for lifting		
Ergonomics		
Therapeutic exercises		
Other education		

Appendix E

Tables 1 and 2

Table 1: Data Sources for Educational Topics

Literature	Level of Findings	Current Condition and its Risk Factors	Plan of Care
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Sluijs, 1991a & b Chase, et al., 1993 Gahimer & Domholdt, 1996	Simonds & Kanters, 1990 Chase, et al., 1993
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Gill, et al., 1994 Poitras, et al., 2005	Gill, et al., 1994
Systematic Reviews, Practice Guidelines, or Clinical Trials (Level 1 Findings)	Level 1	Evans, et al., 1987[a] Stankovic & Johnell, 1990 (education was part of a "mini back school") Cherkin, et al., 1996[a] Cherkin, et al., 1998[a] Burton, et al., 1999[a]	
Low Back Pain Literature	Level 2	Klaber Moffett, 2002 Nordin, et al., 2006	Nordin, et al., 2006
Professional Literature (Level 1 Findings)	Level 1	*Guide to Physical Therapist Practice, 2001* *Guide for Professional Conduct*	*Guide to Physical Therapist Practice, 2001* *Guide for Professional Conduct* *Standards of Practice for Physical Therapy and the Criteria*
Education Literature	Level 2	Ornstein & Hunkins, 1998	
Related Literature		Deyo & Diehl, 1986 Roland & Dixon, 1989[a] Chapman, et al., 1997 Little, et al., 2001[a] Roberts, et al., 2002[a]	Payton, et. al. 1998
Textbooks	Level 2	Cyriax, 1975 McKenzie, 1997 McKenzie & May, 2003	Mulligan, 1999 (explain about the manual technique to be used) McKenzie & May, 2003 Saunders & Ryan, 2004 (explain purpose of the exercises)

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

Table 1, Continued.

Literature	Level of Findings	Self-Limiting Nature of LBP/Resume Normal Activities	Resume Normal Activities as Tolerated
Physical Therapy Patient Education (Descriptive Studies)	Level 2		
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2		
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Cherkin, et al., 1996[a] Cherkin, et al., 1998[a] Seferlis, et al., 1998^ Burton, et al., 1999[a] Hazard, et al., 2000[a] George, et al., 2003[a] Long, et al., 2004[a]	Malmivaara, et al., 1995 Abenhaim, et al., 2000˙ Hagen, et al., 2002 Van Tulder, et al., 2006
Low Back Pain Literature	Level 2	Waddell, 1987 DeRosa & Porterfield, 1992 Nordin, et al., 2002 Nordin, et al., 2006 Klaber Moffett, 2002	DeRosa & Porterfield, 1992 Deyo, 1996 Deyo, 1998 Klaber Moffett, 2002 Nordin, et al., 2002 Quittan, 2002 Nordin, et al., 2006
Professional Literature	Level 1		
Education Literature	Level 2	Ornstein & Hunkins, 1998	
Related Literature		Lethem, et al., 1983 Slade, et al., 1983 Waddell, et al., 1993 Chapman, et al., 1997 Klaber Moffett, et al., 1999 Vlaeyen & Linton, 2000 Little, et al., 2001[a] Roberts, et al., 2002[a] Goubert, et al., 2004 Shaw, et al., 2005	
Texbooks	Level 2	Cyriax, 1975 (normal activities should be modified in order to maintain the lordosis) Saunders & Ryan, 2004	McKenzie & May, 2003 (patients should not be made fearful of normal activities) Saunders & Ryan, 2004

[a] This topic was used as a component of a patient education program or treatment group in this study.
^ Education on the self-curing nature of low back pain was one of the components of a treatment group in this study.
˙ Normal activities was defined as activities of daily living (activities associated with personal care, eating, and normal, daily household activities).

Table 1, Continued.

Literature	Level of Findings	Patient Participation in Goal Setting	Physical Agents for Pain Control
Physical Therapy Patient Education (Descriptive Studies)	Level 2		Chase, et.al., 1993 (education for pain management; no other information was provided)
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2		Battie, et.al., 1994* Van der Valk, 1995* Li & Bombardier, 2001* Poitras, et.al., 2005 (education for pain control; no other information was provided)
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1		Chok, et al., 1999[a] French, et al., 2006
Low Back Pain Literature	Level 2	Nordin, et al., 2002 Klaber Moffett, 2002	DeRosa & Porterfield, 1992* Nordin, et al., 2002 Quittan, 2002* Nordin, et al., 2006
Professional Literature	Level 1	*Guide to Physical Therapist Practice, 2001* *Guide for Professional Conduct* *Standards of Practice for Physical Therapy and the Criteria*	*Guide to Physical Therapist Practice, 2001*ˇ
Education Literature	Level 2	Knowles, 1984 Ornstein & Hunkins, 1998	
Related Literature		Croft, 1980 Alexandre, et al., 2002 Sluijs, et al., 1993 Baker, et al., 2001 Payton, et al., 1998 Mullen, et al., 1992 Hammond & Freeman, 2001 Saarmann, et al., 2000 Wise, 2001 Anderson & Funnell, 2005	Jette & Jette, 1996 Little, et al., 2001[a] Roberts, et al., 2002[a] Michlovitz & von Nieda, 2006
Textbooks	Level 2	McKenzie & May, 2003	Saunders & Ryan, 2004*

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

* Although the use of physical agents was included in this source, patient education for its use was not described.

ˇ An expected outcome of patient/client related instruction may include: "self-management of symptoms is improved" (American Physical Therapy Association, 2001, p. 223).

Table 1, Continued.

Literature	Level of Findings	Therapeutic Exercises	
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Chase, et al., 1993	
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Gill, et al., 1994 Battie, et al., 1994 van der Valk, 1995 Kerssens, et al., 1999a Foster, et al., 1999	Li & Bombardier, 2001 Jackson, 2001 Poitras, et al., 2005 Byrne, et al., 2005
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Evans, et al., 1987[a] Stankovic & Johnell, 1990 & 1995[a] Malmivaara, et al., 1995 Cherkin, et al., 1998 Seferlis, et al., 1998 Chok, et al., 1999[a]	Klaber Moffett, et al., 1999[a] Van Tulder, et al., 2000 Pengel, et al., 2002 George, et al., 2003[a] Long, et al., 2004[a] Hayden, et al., 2005 Van Tulder, et al., 2006
Low Back Pain Literature	Level 2	Williams, 1937 a & b Kennedy, 1965 Kendall & Jenkins, 1968 Jackson & Brown, 1983 DeRosa & Porterfield, 1992	Delitto, et al., 1995 Saal, 1996 Deyo, 1998 Nordin, et al., 2002 (after 4 weeks) Nordin, et al., 2006 (after 4 weeks)
Professional Literature	Level 1		
Education Literature	Level 2		
Related Literature		Saal & Saal, 1989 Roland & Dixon, 1989 Saal, 1992 Jette, et al., 1994 Richardson & Jull, 1995 Jette & Jette, 1996 Jette & Delitto, 1997	Fritz, 1998 Ariyoshi, et al., 1999 Hides, et al., 2001 Fritz & Hicks, 2001 Descarreaux, et al., 2002 Fritz, et al., 2003 Akuthota & Nadler, 2004 Barr, et al., 2005 Bakhtiary, et al., 2005
Textbooks	Level 2	McKenzie, 1997 Mulligan, 1999 McKenzie & May, 2003 Saunders & Ryan, 2004 Maitland, 2005 (for painful disc pathology, use caution with flexion exercises)	

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

Table 1, Continued.

Literature	Level of Findings	McKenzie Approach	Aerobic Capacity Conditioning Endurance Exercises	Graded Exercise Program
Physical Therapy Patient Education (Descriptive Studies)	Level 2			
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Foster, et al., 1999 Jackson, 2001 Byrne, et al., 2005 Poitras, et al., 2005	Gill, et al., 1994 Battie, et al., 1994 Kerssens, et al., 1999 Poitras, et al., 2005	
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Stankovic & Johnell, 1990 & 1995 Cherkin, et al., 1998 Long, et al., 2004	Saal & Saal, 1989 Chok, et al., 1999 Klaber Moffett, et al., 1999[a]	Fordyce, et al., 1986 Klaber Moffett, et al., 1999 George, et. al, 2003
Low Back Pain Literature	Level 2	Quittan, 2002	Jackson & Brown, 1983 DeRosa & Porterfield, 1992 Nordin, et al., 2002 (after 4 weeks)	Fordyce, et al., 1973
Professional Literature	Level 1			
Education Literature	Level 2			Ornstein & Hunkins, 1998 Avers & Gardner, 2000
Related Literature			Cady, et al., 1979 Jette & Jette, 1996 Jette & Delitto, 1997	Mullen, et. al, 1992 Vlaeyen & Linton 2000
Textbooks	Level 2	McKenzie, 1997 Mulligan, 1999 McKenzie & May, 2003 Saunders & Ryan, 2004		

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

Table 1, Continued.

Literature	Level of Findings	Activities & Activity Modification	Posture & Positioning
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Sluijs, 1991a & b, Gahimer & Domholdt, 1996	Sluijs, 1991a & b Chase, et al., 1993 Gahimer & Domholdt, 1996
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Gill, et al., 1994 Kerssens, et al., 1999a Poitras, et al., 2005	Kerssens, et al., 1999a Jackson, 2001 Poitras, et.al., 2005
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Stankovic & Johnell, 1990 & 1995 (education to "keep on the move" was part of a "mini back school") Burton, et al., 1999[a] Long, et al., 2004[a]	Evans, et al., 1987[a] Stankovic & Johnell, 1990 (education in use of semi-Fowler or fetal position as part of a "mini back school") Seferlis, et al., 1998[a] Chok, et al., 1999[a]
Low Back Pain Literature	Level 2	Nordin et al., 2002 Klaber Moffett 2002 Taylor, et al., 2003	Klaber Moffett, 2002
Professional Literature	Level 1	*Guide to Physical Therapist Practice, 2001*[˅]	
Education Literature	Level 2	Ornstein & Hunkins, 1998	
Related Literature		Chapman, et al., 1997 McGill, 1997 Panel on MSD, 2001 Callaghan & McGill, 2001 Little, et al., 2001[a] Mueller & Maluf, 2002 Pope, et al., 2002 Roberts, et al., 2002[a]	Videman, et al., 1990 McGill, 1997 Wilke, et al., 1999 Callaghan & McGill, 2001 Little, et al., 2001[a] Van Dieen, et al., 2001 Roberts, et al., 2002[a] Pope, et al., 2002
Textbooks	Level 2	Cyriax, 1975 McKenzie, 1997 McKenzie & May, 2003 Saunders & Ryan, 2004 Maitland, 2005	Cyriax, 1975 McKenzie, 1997 Mulligan, 1999 McKenzie & May, 2003 Saunders & Ryan, 2004 Mailtand, 2005

[a] This topic was used as a component of a patient education program or treatment group in this study.

[˅] An expected outcome of patient/client-related instruction is that the "ability to perform physical actions, tasks, or activities is improved" (American Physical Therapy Association, 2001, p. 223).

Table 1, Continued.

Literature	Level of Findings	Body Mechanics	Ergonomics/Work Modifications	Lifting Instructions
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Chase, et al., 1993	Sluijs, 1991a & b Chase, et al., 1993 Gahimer & Domholdt, 1996	
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Battie, et al., 1994	Kerssens, et al., 1999a Li & Bombardier, 2001 Poitras, et al., 2005	Kerssens, et al., 1999a
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1		Evans, et al., 1987[a]	
Low Back Pain Literature	Level 2	DeRosa & Porterfield, 1992	Cyriax, 1975 Pope, et.al., 2002 Nordin, et al., 2006 (after 4 weeks)	Klaber Moffett, 2002 Pope, et al., 2002 Lorenz, et al., 2002 Nordin, et al., 2002
Professional Literature	Level 1			
Education Literature	Level 2			
Related Literature		Little, et al., 2001[a] Roberts, et al., 2002[a]	Little, et al., 2001[a] Roberts, et al., 2002[a]	McGill, 1997 Panel on MSD, 2001 Little, et al., 2001[a] Roberts, et al., 2002[a]
Textbooks	Level 2	Cyriax, 1975 McKenzie, 1997 McKenzie & May, 2003 Saunders & Ryan, 2004 Maitland, 2005	Cyriax, 1975 McKenzie, 1997 McKenzie & May, 2003[n] Saunders & Ryan, 2004	Cyriax, 1975 McKenzie, 1997 Saunders & Ryan, 2004 Maitland, 2005 (to help prevent recurrences)

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.
[n] This source stated that good quality evidence was not available for the effectiveness of ergonomics instruction.

Table 1, Continued.

Literature	Level of Findings	Devices & Equipment	Health, Wellness, and Fitness
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Sluijs, 1991a Chase, et al., 1993 Gahimer & Domholdt, 1996	Sluijs, 1991a & b Simonds & Kanters, 1990
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Kerssens, et al., 1999a Li & Bombardier, 2001 Poitras, et.al., 2005	Kerssens, et al., 1999a
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Cherkin, et al., 1998 [a] Pengel, et al., 2002 Van Tulder, et al., 2006	
Low Back Pain Literature	Level 2	Kottke, 1961	Nordin, et al., 2002
Professional Literature	Level 1		*Guide to Physical Therapist Practice*
Education Literature	Level 2		
Related Literature		Little, et al., 2001 [a] Roberts, et al., 2002 [a]	Cady, et al., 1979 Deyo & Bass, 1989 Harreby, et al., 1997 Little, et al., 2001 [a] Roberts, et al., 2002 [a]
Textbooks	Level 2	Cyriax, 1975 McKenzie, 1997 Mulligan, 1999 McKenzie & May, 2003 Saunders & Ryan, 2004	McKenzie & May, 2003 Saunders & Ryan, 2004 (for treatment of poor physical condition)

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

Table 1, Continued.

Literature	Level of Findings	Self-Care	Home Exercises/Home Program
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Sluijs, 1991a & b Gahimer & Domholdt, 1996	Sluijs, 1991a & b Dekker, et al., 1993 Chase, et al., 1993 Gahimer & Domholdt, 1996
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Kerssens, et al., 1999b	Gill, et al., 1994 Foster, et al., 1999 Li & Bombardier, 2001
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Stankovic & Johnell, 1990 & 1995[a] Burton, et al., 1999[a] Hazard, et al., 2000[a]	Malmivaara, et al., 1995[a]
Low Back Pain Literature	Level 2	DeRosa & Porterfield, 1992 Klaber Moffett, et al., 1999 Klaber Moffett, 2002 Nordin, et al., 2002 Nordin, et al., 2006	Klaber Moffett, 2002
Professional Literature	Level 1		
Education Literature	Level 2	Bandura, 1977	
Related Literature		Allegrante, et al., 1991 Chapman, et al., 1997 Holmes, et al., 1997 Avers & Gardner, 2000 Little, et al., 2001[a] Hammond & Freeman, 2001[a] Roberts, et al., 2002[a] Roberts, et al., 2002[a] Johnston, et al., 2002 Focht, et al., 2005	
Textbooks	Level 2	McKenzie, 1997 Mulligan, 1999 McKenzie & May, 2003 Saunders & Ryan, 2004 (for management of poor physical condition)	McKenzie, 1997 McKenzie & May, 2003 Saunders & Ryan, 2004 Maitland, 2005 (if therapeutic exercises are used)

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

Table 1, Continued.

Literature	Level of Findings	Bed Rest	Role of Imaging Studies
Physical Therapy Patient Education (Descriptive Studies)	Level 2		
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Battie, et al., 1994 Li & Bombardier, 2001	
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Evans, et al., 1987 Malmivaara, et al., 1995 Hagen, et al., 2000 Abenheim, et al., 2000 Van Tulder, et al., 2006	Cherkin, et al., 1996[a] Cherkin, et al., 1998[a]
Low Back Pain Literature	Level 2	Kottke, 1961 Quittan, 2002 (only recommended in specific instances)	Deyo, 1998 Nordin, et al., 2006
Professional Literature	Level 1		
Education Literature	Level 2		
Related Literature			Jensen, et al., 1994 Deyo, 1998 Little, et al., 2001[a] Roberts, et al., 2002[a] Goubert, et al., 2004
Textbooks	Level 2	McKenzie, 1997 (use if pain is severe; use no more than 2-3 days) Saunders & Ryan, 2004 (only used if symptoms are severe)	

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

Table 1, Continued.

Literature	Level of Findings	Signs/Symptoms of Complications	Stress Management	Rest
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Chase, et al., 1993	Sluijs, 1991a & b Gahimer & Domholdt, 1996	Sluijs, 1991a & b Gahimer & Domholdt, 1996
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2			Kerssens, et al., 1999a
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Roland & Dixon, 1989[a]		Seferlis, et al., 1998[a]
Low Back Pain Literature	Level 2		Nordin, et al., 2002	
Professional Literature	Level 1			
Education Literature	Level 2			
Related Literature			Panel on MSD, 2001	
Textbooks	Level 2	McKenzie, 1997 (as related to use of exercises) McKenzie & May, 2003 (as related to use of exercises) Saunders & Ryan, 2004 (only use exercises if they do not produce an increase in leg symptoms) Maitland, 2005 (as related to use of exercises)		McKenzie, 1997

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

Table 1, Continued.

Literature	Level of Findings	Prevention	Back School	Medications
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Chase, et al., 1993		
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2		Foster, et al., 1999 Li & Bombardier, 2001	Battie, et al., 1994 Kerssens, et al., 1999a
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Cherkin, et al., 1996[a]	Stankovic & Johnell, 1990 & 1995 Scheer, et al., 1995 DiFabio, 1995 Van Tulder, et al., 2006	Seferlis, et al., 1998[a] Van Tulder, et al., 2006
Low Back Pain Literature	Level 2		Klingenstierna, 1991 Klaber Moffett, 2002	Deyo, 1996 Nordin, et al., 2002 Quittan, 2002 Nordin, et al., 2006
Professional Literature	Level 1			
Education Literature	Level 2			
Related Literature		Roland & Dixon, 1989		
Textbooks	Level 2	McKenzie, 1997 McKenzie & May, 2003 Saunders & Ryan, 2004 (industrial back injury)		McKenzie, 1997

[a] This patient education topic was used as a component of a patient education program or treatment group in this study.

Table 2: Data Sources for Teaching Methods

Literature	Level of Findings	Individualized Handout	Pre-published Material	Computer or Video Program
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Chase, et al., 1993 Laitakari, et al., 1997	Chase, et al., 1993	Chase, et al., 1993
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2			Gill, et al., 1994
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Schneiders, et al., 1998 Weeks, et al., 2002 Reo & Mercer, 2004	Roland & Dixon, 1989 Cherkin, et al., 1996 Burton, et al., 1999 Hazard, et al., 2000 Little, et al., 2001 Roberts, et al., 2002 George, et al., 2003	Weeks, et al., 2002 Reo & Mercer, 2004 Lysack, et al., 2005
Low Back Pain Literature	Level 2	Nordin, et al., 2002 Klaber Moffett, 2002	Nordin, et al., 2002 Klaber Moffett, 2002 Nordin, et. al, 2006	Nordin, et al., 2002
Professional Literature	Level 1			
Education Literature	Level 2			Bandura, 1977
Related Literature		Evans, et al., 1987 Malmivaara, et al., 1995 Cherkin, et al., 1998	Stankovic & Johnell, 1990 Chapman & Langridge, 1997 Langridge, et al., 1997 Cherkin, et al., 1998 Dickinson, et al., 2001 Jacob, et al., 2003	Evans, et al., 1987
Textbooks	Level 2	McKenzie & May, 2003	McKenzie & May, 2003	

Table 2, Continued.

Literature	Level of Findings	Individual Training	Verbal Instruction
Physical Therapy Patient Education (Descriptive Studies)	Level 2	Chase, et al., 1993 (demonstration) Laitakari, et al., 1997 (skills training)	Sluijs, 1991 a & b Chase, et al., 1993 Gahimer & Domholdt, 1996 Laitakari, et al., 1997
Physical Therapy Practice in Low Back Pain (Descriptive Studies)	Level 2	Poitras, et al, 2005 (simulation of ADL or work tasks)	Kerssens, et al., 1999a & b Poitras, et al., 2005
Systematic Reviews, Practice Guidelines, or Clinical Trials	Level 1	Friedrich, et al., 1996 Hagins, et al., 1999 Reo & Mercer, 2004	Schneiders, et al., 1998
Low Back Pain Literature	Level 2	Kester, 1968 Saal & Saal, 1989 DeRosa & Porterfield, 1992 (neuromuscular retraining) Klaber Moffett, 2002	DeRosa & Porterfield, 1992 Cherkin, et al., 1996 Nordin, et al., 2002 Klaber Moffett, 2002
Professional Literature	Level 1	*Guide to Physical Therapist Practice, 2001* (functional training)	
Education Literature	Level 2	Bandura, 1977	
Related Literature		Malmivaara, et al., 1995 (individual instruction)	Stankovic & Johnell, 1990 Saarmann, et al., 2000
Textbooks	Level 2	McKenzie & May, 2003 (for therapeutic exercise instruction)	Mulligan, 1999 (for explaining about the manual technique to be used)

Vita

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