PREOPERATIVE EDUCATION
FOR PATIENTS UNDERGOING
LUMBAR SPINE SURGERY FOR RADICULOPATHY

Adriaan Louw

Thesis presented in fulfillment of the requirements for the degree of Master of Physiotherapy at Stellenbosch University

PROJECT SUPERVISORS:

Prof. Q Louw

Mrs. LC Crous

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DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature: ............................................

Date: ............................................
ABSTRACT
Postoperative rehabilitation programs have shown little efficacy in decreasing pain and disability in short and long term outcomes for lumbar discectomy. Preoperative education in other disciplines of medicine and physiotherapy has shown to decrease pain and disability postoperatively. No studies to date have been published on preoperative education for spinal lumbar surgery patients with radiculopathy.

Objective:
The objective of this study was to contribute towards further understanding of the preoperative educational requirements of patients undergoing lumbar surgery for lumbar radiculopathy.

Method
Two surveys were conducted. A new questionnaire was developed for patients to determine their preoperative educational needs regarding spinal surgery due to radiculopathy. These questionnaires were administered at 4-weeks postoperatively to patients from four spinal surgeons in the Greater Kansas City metropolitan area of the US. A second physiotherapist survey was developed and distributed to physiotherapists registered with the Kansas and Missouri State Boards who were actively involved in treating spinal surgery patients in Kansas and Missouri. The data collected from completed questionnaires were analyzed using descriptive and inferential statistical tests.

Results:
Forty-seven patients and hundred and forty one physiotherapists completed the surveys. All patients (100%) and 99% of therapists indicated that they view preoperative education to be an important component in the management of lumbar spinal surgery patients. The most important factors identified for inclusion in pre-operative educational programs incorporated the reason for surgery and risks associated with spinal lumbar surgery for radiculopathy. Alternatives to surgery and functional limitations following surgery were also deemed to be educational requirements. The patient and therapist groups both rated education regarding pain, especially the outcome of pain post operatively as a highly important component in the education of this patient population. The preferred method of delivery was verbal education delivered on an individual basis.
Conclusion:
Patients having undergone lumbar spine surgery for radiculopathy and physiotherapists treating postoperative lumbar spine patients regard preoperative education for lumbar surgery as a very important. Preoperative educational programs should be developed and implemented to determine if such programs result in better outcomes related to pain and disability following lumbar spine surgery.
ABSTRAK:
Rehabilitasie programme na chirurgie is gewys om min veranderinge aan pain en gebrek te maak in kort en lang termy na discectomy chirurgie. Preoperatiewe opleiding in ander dissipline van medisyne en fisioterapie het gewys dat dit pyn en gebrek kan verminder na chirurgie. Geen studies is al gepubliseer op preoperatiewe onderrig vir spinale chirurgie pasiënte nie.

Objektief:
Hierdie studie se objektief was om n bydra te maak ten opsigte van n betere begrip van die preoperatiewe opleiding benodighede vir pasiënte wat spinale chirurgie ondergaan vir “lumbar radiculopathy”.

Metode:
Twee vraelyste was ontwikkel. n Nuwe pasiënte vraelys was ontwikkel om die preoperatiewe benodighede te bepaal vir pasiënte vir spinale chirurgie met “lumbar radiculopathy.” Die vraelys was versprei aan pasiënte in vier spinale chirurje se kantore in Kansas City in the VSA. n Tweede fisioterapeut vraelys was ontwikkel en versprik aan fisioterapeutte geregistreerd by die “Kansas and Missouri Board of Healing Arts,” aktief betrokke in the behandeling van spinale chirurgie pasiënte. Die data van die voltooide vraelyst was geanaliseer met die gebruik van “inferential statistical tests.”.

Uitslae:
Sewe-en-veertig pasiënte en een-honderd-en-veertig fisioterapeute het die vraelyste voltooi. Al die pasiënte (100%) en 99% van die fisioterapeute het preoperatiewe onderrig as baie belangrik gegradeer vir spinale chirurgie pasiënte. Die mees belangrikste faktore wat geidentifiseer was vir insluiting in n preoperatiewe opleidings program was rede vir chirurgie en risiko geassosieer met die chirurgie vir “lumbar radiculopathy.” Alternatiewe behandelings en limiete na chirurgie was ook as belangrik geag. Die pasiënt en fisioterapeut groepe het alby onderrig met betrekking tot pyn, veral chirurgie se inpak om pyn te verander, as baie belangrik gegradeer. Mondelingse instruksie was die mees aanbeveelde metode vir opleiding vir pasiënte vir spinale chirurgie.

Gevolgtrekking
Pasiënte wat spinal chirurgie ondergaan het vir “lumbar radiculopathy” en fisioterapeute wat spinale chirurgie pasiënte behandel ag preoperatiewe instruksie vir lumbale chirurgie as baie belangrik. Preoperatiewe programme
behoort ontwikkel te raak en geimplimenteer word om te bepaal of sulke programme beter resultate verkry ten opsigte van pyn en gebrek na lumbale chirurgie.
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<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of hits on databases and journals</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Excluded studies after title reviews</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>Total Possible Hits</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Reasons for exclusion after abstract review</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>Total after review of abstracts</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Total number of full-text articles for review</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>Critical appraisal</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>Participants of postoperative rehabilitation</td>
<td>18</td>
</tr>
<tr>
<td>9</td>
<td>Postoperative rehabilitation</td>
<td>19</td>
</tr>
<tr>
<td>10</td>
<td>Treatment, dosage, frequency and delivery method</td>
<td>20</td>
</tr>
<tr>
<td>11</td>
<td>Outcome measures and scale</td>
<td>22</td>
</tr>
<tr>
<td>12</td>
<td>Ostelo et al 2003a 6-month follow-up</td>
<td>23</td>
</tr>
<tr>
<td>13</td>
<td>Ostelo et al 2003b 12-month follow-up</td>
<td>25</td>
</tr>
<tr>
<td>14</td>
<td>Filiz et al 2004</td>
<td>26</td>
</tr>
<tr>
<td>15</td>
<td>Donaldson et al 2006</td>
<td>27</td>
</tr>
<tr>
<td>16</td>
<td>Dolan et al 2000</td>
<td>28</td>
</tr>
<tr>
<td>17</td>
<td>Christensen et al 2003</td>
<td>29</td>
</tr>
<tr>
<td>18</td>
<td>Patient questionnaires per demographic region</td>
<td>47</td>
</tr>
<tr>
<td>19</td>
<td>Patient main themes regarding surgery education</td>
<td>51</td>
</tr>
<tr>
<td>20</td>
<td>Average patient scores per section</td>
<td>51</td>
</tr>
<tr>
<td>21</td>
<td>Surgical procedure mean scores</td>
<td>53</td>
</tr>
<tr>
<td>22</td>
<td>Medical care mean scores</td>
<td>54</td>
</tr>
<tr>
<td>23</td>
<td>Symptoms, prognosis and recovery mean scores</td>
<td>56</td>
</tr>
<tr>
<td>24</td>
<td>Activity, mobility and physical therapy mean scores</td>
<td>58</td>
</tr>
<tr>
<td>25</td>
<td>Ten most important issues for patients</td>
<td>60</td>
</tr>
<tr>
<td>26</td>
<td>Ten most important issues for therapists</td>
<td>61</td>
</tr>
<tr>
<td>27</td>
<td>Surgical procedure: PT vs. patient</td>
<td>62</td>
</tr>
<tr>
<td>28</td>
<td>Medical care: PT vs. patient</td>
<td>62</td>
</tr>
<tr>
<td>29</td>
<td>Symptoms, prognosis and recovery: PT vs. patient</td>
<td>63</td>
</tr>
<tr>
<td>30</td>
<td>Activity, mobility and physical therapy: PT vs. patient</td>
<td>63</td>
</tr>
<tr>
<td>31</td>
<td>Preferred education: Physical therapists</td>
<td>66</td>
</tr>
</tbody>
</table>
32  Preferred profession for preoperative education  
33  Location and intensity of pain postoperatively  
34  Thoughts and feelings about pain: Patient and PT
<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patient educational background</td>
<td>48</td>
</tr>
<tr>
<td>2</td>
<td>Annual income reported by patients</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>Physical therapist practice setting</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>The benefit of preoperative education</td>
<td>52</td>
</tr>
<tr>
<td>5</td>
<td>Alternative to surgery: Outpatient PT vs. inpatient PT</td>
<td>53</td>
</tr>
<tr>
<td>6</td>
<td>Seeing the surgeon: Outpatient PT vs. inpatient PT</td>
<td>54</td>
</tr>
<tr>
<td>7</td>
<td>Seeing the surgeon: Correlated to patient income</td>
<td>55</td>
</tr>
<tr>
<td>8</td>
<td>Preoperative pain: Correlated to PT experience</td>
<td>56</td>
</tr>
<tr>
<td>9</td>
<td>Surgery site pain: Correlated to PT experience</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>Other pain: Correlated to PT experience</td>
<td>57</td>
</tr>
<tr>
<td>11</td>
<td>Preoperative pain: Correlated to patient age</td>
<td>58</td>
</tr>
<tr>
<td>12</td>
<td>Return to work: Correlated to patient income</td>
<td>59</td>
</tr>
<tr>
<td>13</td>
<td>Education delivery method received by patients</td>
<td>64</td>
</tr>
<tr>
<td>14</td>
<td>Education delivery method preferred by patients</td>
<td>65</td>
</tr>
<tr>
<td>15</td>
<td>Surgeons providing education: PT knowledge</td>
<td>66</td>
</tr>
<tr>
<td>16</td>
<td>Patient primary reason for spinal surgery</td>
<td>68</td>
</tr>
<tr>
<td>17</td>
<td>Patients experiencing pain after surgery</td>
<td>69</td>
</tr>
<tr>
<td>18</td>
<td>Pain ratings: Outpatient PT vs. inpatient PT</td>
<td>70</td>
</tr>
<tr>
<td>19</td>
<td>Pain expectancy following surgery</td>
<td>70</td>
</tr>
<tr>
<td>20</td>
<td>Distribution of pain postoperatively</td>
<td>71</td>
</tr>
<tr>
<td>21</td>
<td>Reason for surgery – patient perception</td>
<td>72</td>
</tr>
<tr>
<td>22</td>
<td>Patient’s fears and anxiety associated with pain</td>
<td>72</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title page</td>
<td>i</td>
</tr>
<tr>
<td>Declaration</td>
<td>ii</td>
</tr>
<tr>
<td>Abstract</td>
<td>iii</td>
</tr>
<tr>
<td>Abstrak</td>
<td>v</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>vii</td>
</tr>
<tr>
<td>List of tables</td>
<td>viii</td>
</tr>
<tr>
<td>List of figures</td>
<td>x</td>
</tr>
</tbody>
</table>

## CHAPTER 1: INTRODUCTION

1

## CHAPTER 2: SYSTEMATIC REVIEW OF THE LITERATURE

4

2.1 Introduction                           4

2.2 Objectives                             7

2.3 Definitions                            7

2.4 Review method                          9

2.4.1 Criteria for considering studies for this review 9

2.4.2 Search strategy                      10

2.5 Search findings                        12

2.5.1 Assessment of methodological quality 14

2.6 Results                                16

2.6.1 Search results                       16

2.7 Discussion                             30

2.8 Conclusion                             33

## CHAPTER 3: METHODOLOGY

35

3.1 Section 1                               35

3.1.1 Study 1: Patient survey              35

3.1.2 Objective                            35

3.1.3 Study design                         35

3.1.4 Sample description                   35

3.1.5 Sample size                          35

3.1.6 Subject recruitment                  37
CHAPTER 4 RESULTS

4.1 Demographic data from the patient questionnaires
   4.1.1 Age
   4.1.2 Sex
   4.1.3 Ethnicity
   4.1.4 Type of surgery
   4.1.5 Educational background
   4.1.6 Income

4.2 Demographic data from the physical therapist questionnaires
   4.2.1 Age
   4.2.2 Highest attained degree by physical therapists
   4.2.3 Clinical experience
   4.2.4 Employment
   4.2.5 Having undergone spinal surgery themselves
   4.2.6 Formal certification

4.3 How important patients regard preoperative education
   4.3.1 Is preoperative education important?
   4.3.2 Was preoperative education beneficial?
4.4 Information patients and therapists rate as important
  4.4.1 Surgical procedure
  4.4.2 Medical care
  4.4.3 Symptoms, prognosis and recovery
  4.4.4 Activity, mobility and physical therapy
4.5 Most important sub-categories: patients
4.6 Most important sub-categories: therapists
4.7 Comparison of educational needs: patients and therapists
  4.7.1 Surgical procedure
  4.7.2 Medical care
  4.7.3 Symptoms, prognosis and recovery
  4.7.4 Activity, mobility and physical therapy
4.8 Education delivery method preferred
  4.8.1 Education delivery method received: patients
  4.8.2 Use of the Internet
  4.8.3 Preferred method of preoperative education delivery
  4.8.4 Providing preoperative education – therapists
  4.8.5 Providing preoperative education – surgeons
  4.8.6 Therapist’s preferred method of preoperative education
  4.8.7 Preferred professional providing education
4.9 Pain, spinal surgery and pain science education
  4.9.1 Reason for spinal surgery
  4.9.2 Experiencing pain following surgery?
  4.9.3 Pain rating following lumbar spine surgery
  4.9.4 Expected pain?
  4.9.5 Location of the pain following lumbar spine surgery
  4.9.6 Reason for persistent pain
  4.9.7 Feelings and thoughts related to persistent pain

CHAPTER 5: DISCUSSION
5.1 The importance of preoperative education
5.2 Information required in preoperative programmes
  5.2.1 Pain education in preoperative educational programmes
5.3 Education delivery method
APPENDICES
1. Specific search strategies for each database
2. Full text articles for the systematic review
3. Data extraction sheets of article for systematic review
4. National Health and Medical Research Council Australia 2002
5. Letters to the surgeons
6. Surgeons letters of agreement for the study
7. Example of a postoperative report
8. Patient instruction sheet and consent
9. Patient demographic information
10. Patient questionnaire
11. Questionnaire checklist
12. Letter to the expert panel
13. Physiotherapist consent and demographic information
14. Physiotherapist instructions
15. Physiotherapist questionnaire
16. Physiotherapist letter
17. Postcard reminders to physiotherapists
18. Body chart
1. INTRODUCTION

Low back pain (LBP) is the most widely reported musculoskeletal disorder in the world, and it is reported that 70% – 80% of all people will develop LBP during their life (Anderson 1997; Deyo and Mizra 2006). Epidemiological data shows that the prevalence of LBP is not decreasing and is still at epidemic proportions (Waddell and Burton 2005).

LBP can manifest itself in various clinical ways, including lumbar radiculopathy or sciatica (Bogduk and Twomey 1997). Ostelo, et al., 2004, state that “lumbosacral radicular syndrome is characterized by irradiating pain over the buttocks and legs served by one or more spinal nerve roots of the lumbar vertebrae or sacrum, combined with phenomena associated with nerve root tension or neurological deficit.” The proposed mechanism behind lumbar radiculopathy is varied and can include, apart from medical etiologies, space-occupying effects of a herniated disc (Bogduk and Twomey 1997; Greening 2004), inflammatory material of the disc (Bogduk and Twomey 1997, Omarker and Myers 1998), facet joint injuries (Bogduk and Twomey 1997), foraminal stenosis (Bogduk and Twomey 1997; Fritz, et al., 1998; Chang, et al., 2006) or development of a cyst (Chiba, et al., 2001).

The primary surgical intervention for lumbar radiculopathy is lumbar laminectomy or lumbar laminotomy with or without discectomy (North American Spine Society). The proposed mechanism for relief of symptoms is the creation of space, which increases blood flow to the nerve root and removes irritant inflammatory substances from the nerve root and intervertebral foramen (Gibson, et al., 2000). Spinal surgery is very common. The likelihood of having back surgery in the United States is at least 40% higher than in any other country and more than five times higher than in England (Lurie et al 2003; Deyo and Mizra 2006). Spinal surgery has also come under scrutiny, especially with studies now clearly showing the success rate of lumbar disc surgery varying between 60% and 90% (Lurie, et al., 2003; Ostelo, et al., 2004; Deyo and Mizra 2006). These figures show that 10% – 40% of patients following spinal surgery will have a poor outcome, with
resulting pain, loss of movement and loss of function (Ostelo, et al., 2004). If disabling symptoms persist following surgery, rehabilitation, consisting mainly of exercise, is often prescribed and is postulated to decrease disability, increase movement and facilitate return to regular activities (Delamater, et al., 2001). A recent Cochrane review found very little efficacy of such postsurgical rehabilitation programs (Ostelo, et al., 2004).

In medicine, patient education forms a part of management that is often neglected (Main, et al., 2000). There is evidence that education is beneficial as a treatment strategy in medical conditions such as asthma (Wolf, et al., 2003), diabetes (Ellis, et al., 2004) and cardiac conditions (Bailey 2004). In the orthopedic domain, there are a number of studies on the effect of education on pain and disability, with outcomes ranging from “excellent” (Udermann, et al., 2004) to “poor” (Gross, et al., 2000). These educational programs focused on biomechanics, structure and anatomy. In recent research, educating patients on neurophysiology has been shown to result in significant improvements in patients’ attitudes about and relation to pain (Moseley 2002), improvements in pain cognition and physical performance (Moseley, et al., 2004), increased pain thresholds during physical tasks (Mosley 2004), improved outcomes of therapeutic exercises (Moseley 2003b), and significant reduction in widespread brain activity characteristic of a pain experience (Moseley 2005). A recent systematic review by Johansson, et al., (2005) of all preoperative education programs in the orthopedic domain found only material relating to total knee and total hip replacements and no studies on preoperative education in spinal surgery populations.

There is a lack of information on preoperative educational approaches for spinal surgery patients, including what such an approach should consist of, who should design and implement the program, and if there is even a need for preoperative education in these patients. It has been suggested that patients’ self-identified needs are different from those identified by health care providers (Goodman 1997; Hussey 1997), and research has shown that educational programs initiated by patient-identified needs have better outcomes when compared to programs initiated by health care providers.
(Goodman 1997; Hussey 1997). By interviewing patients who have recently undergone spinal surgery as well as health care providers who treat postoperative patients, this study aims to determine patient needs associated with lumbar spine surgery for radiculopathy. With an increased understanding of patient needs, preoperative educational programs can be developed or existing programs improved that, if implemented, could be associated with decreased disability, reduced cost and improved outcomes following surgery for lumbar radiculopathy.
2. SYSTEMATIC REVIEW OF THE LITERATURE

Comparing education-and-exercise to exercise-only program outcomes related to pain and disability in lumbar spine surgery patients

2.1 Introduction

Spinal surgery is very common in the United States. The likelihood of having back surgery is at least 40% higher in the US than in any other country and more than five times higher than in England (Lurie, et al., 2003; Deyo and Mizra 2006). Laminectomies for spinal stenosis in the US have increased 400% in the last decade. Overall, about 4% of persons in the United States will have spinal surgery at some point in their lives. National survey data (Deyo, et al., 2004) indicate that the number of spinal fusions rose by 77% between 1996 and 2001. In contrast, total hip arthroplasty (THA) and total knee arthroplasty (TKA) increased by 13% in the same period. Surgery rates within the US also vary, and it has been shown that in regions with greater use of imaging, spinal surgery rates are significantly higher than in regions with less use of imaging techniques (Lurie, et al., 2003).

Studies now clearly show that the success rate of lumbar disc surgery varies between 60% and 90% (Lurie, et al., 2003; Ostelo, et al., 2004; Deyo and Mizra 2006), thus showing that 10% – 40% of lumbar disc surgeries result in persistent or worse pain and disability (Ostelo, et al., 2004). If persistent symptoms are present following surgery, postsurgical rehabilitation, consisting mainly of exercise in varying degrees, is often prescribed and is postulated to decrease disability, increase movement and facilitate return to regular activities (Delamater, et al., 2001). Postoperative rehabilitation for lumbar
spine surgery patients usually comprises varying degrees of exercise; however, these postoperative programs have shown little evidence and limited research to indicate the exact timing, dosage and content of postsurgical rehabilitation programs for spinal surgery patients (Ostelo, et al., 2004).

Patient education forms a part of management in physiotherapy and is often neglected (Main, et al., 2000). There is evidence that education is beneficial as a treatment strategy in medical conditions such as asthma (Wolf, et al., 2003), diabetes (Ellis, et al., 2004) and cardiac disease (Bailey 2004). In the orthopedic domain, a number of studies regarding the effect of education on pain and disability show outcomes ranging from “excellent” (Udermann, et al., 2004) to “poor” (Gross, et al., 2000). Frost, et al., (2005) showed that one session of assessment and advice from a physiotherapist is just as effective as routine physiotherapy in treating acute LBP. Most of these educational programs focus on biomechanics, structure and anatomy. Recent research has shown that educating patients on neurophysiology results in significant improvements in patients’ attitudes and relation to pain (Moseley 2002), pain cognition and physical performance (Moseley, et al., 2004); increased pain thresholds during physical tasks (Moseley 2004); improved outcomes of therapeutic exercises (Moseley 2003b); and significant reduction in widespread brain activity characteristic of a pain experience (Moseley 2005). A recent systematic review of preoperative education programs in the orthopedic domain by Johansson, et al., (2005) found educational
approaches only for total knee and total hip replacements, and none for spinal surgery procedures.

To date, no studies have been done on preoperative education for lumbar spine surgery patients. In these patients, education as a treatment intervention has been used postoperatively (Dolan, et al., 2000; Ostelo, et al., 2004; Filiz, et al., 2005; Christensen, et al., 2003). These educational approaches are rarely used as stand-alone interventions; many times education is combined with other treatment modalities, such as exercise (Ostelo, et al., 2004). No review has been done to determine the efficacy in spinal surgery patients of combining education with treatment approaches such as exercise as compared to approaches that do not include education. In order to determine the value and importance of education in a spinal surgery population, this review set out to determine if postoperative spinal surgery programs that combine education with exercise are more effective in decreasing pain and disability than an exercise-only approach.
2.2. Objectives
The objective of this review was to systematically assess the literature and present the best available evidence to support the effectiveness of education-and-exercise programs over exercise-only programs in lumbar spine surgery patients. This review addressed the following questions:

2.2.1 Does an education-and-exercise approach decrease pain and disability in lumbar spine surgery patients as compared to an exercise-only approach?

2.2.2 What are the content and delivery methods used by educational programs in published research for a patient who has had lumbar spine surgery?

2.3. Definitions
The following definitions were used in this review:

- Arthroplasty – Plastic surgery of a joint or of joints; the formation of moveable joints. (*Dorland’s Medical Dictionary*)

- Back School – Education consisting of information on the anatomy of the back, biomechanics, optimal posture, ergonomics and back exercises. (Zachrisson-Forsell 1981)

- Cognitive Therapy – “A direct form of psychotherapy based on the interpretation of situations (cognitive structure of experiences) that determine how an individual feels and behaves. It is based on the premise that cognition, the process of acquiring knowledge and forming beliefs, is a primary determinant of mood and behavior. The therapy uses behavioral and verbal techniques to identify and correct negative thinking that is at the root of the aberrant behavior.” (PubMed/Medline)

- Discectomy – Excision of an intervertebral disk. (*Dorland’s Medical Dictionary*)
- **Education** – “Instruction and information that helps patients prepare for a procedure, learn about a disease or manage their health. Patient education may include one-on-one instruction from a health care provider, educational sessions in a group setting, or self-guided learning videos or modules. Informative and instructional handouts are usually provided to explain specific medications, tests or procedures.” (PubMed/Medline)

- **Exercise** – The performance of physical exertion for improvement of health or the correction of physical deformity. (*Dorland’s Medical Dictionary*) For the purpose of this review, an exercise-only approach is defined as exercise supervised by a health care professional as part of a rehabilitation program conducted at a health/exercise facility.

- **Instruction** – “Used for education, training programs, and courses in various fields and disciplines, and for training groups of persons.” (PubMed/Medline)

- **Laminectomy** – Excision of the posterior arch of a vertebra. (*Dorland’s Medical Dictionary*)

- **Laminotomy** – Division of the lamina of a vertebra. (*Dorland’s Medical Dictionary*)

- **Spinal Fusion** – Operative immobilization or ankylosis of two or more vertebrae. (*Dorland’s Medical Dictionary*)
2. 4. Review method

2.4.1 Criteria for considering studies for this review

2.4.1.1 Types of studies
Randomized controlled trials (RCTs) that investigated the effectiveness of post–lumbar surgery rehabilitation programs consisting of exercise-only and exercise-and-education protocols were selected for this review. Only studies reported in the English language and containing adults (age 18 and above) were sought, and no limitations were set on timeframes for the studies.

2.4.1.2 Types of participants and intervention
Participants included were adults, male and female, aged 18 and above, who had undergone any or all lumbar spine surgeries: laminectomy, laminotomy, discectomy, microdiscectomy, spinal fusion, vertebroplasty, kyphoplasty, nucleoplasty, intradiscal electrothermy (IDET), disc replacement or instrumentation. Patients must have gone through a postoperative rehabilitation program of either education and exercise or exercise only, or have been part of the control. By definition, this study excluded infants, children and adolescents.

2.4.1.3 Types of outcomes
The primary outcomes chosen for this review were pain and disability, since these are the primary measures of successful surgical outcome in spine patients (Ostelo, et al., 2004). Pain and disability were assessed by any combination of the visual analogue scale (VAS), Roland-Morris Disability Questionnaire (RM), Oswestry (OW) or a modified version, and/or the Low Back Pain Rating scale (LBPR), since these have been validated in the measurement of pain and/or disability.
2.4.2 Search strategy

Before commencing the review, the Cochrane Library, PEDro and PubMed/Medline were searched to ensure that a similar review had not been published. No such reviews were found.

A search strategy was developed to be systematic (i.e., it could be replicated independently) in identifying published and unpublished studies. Twelve databases available at Stellenbosch University and seven online journals featured in databases that were applicable to spinal surgery were searched between July 17 and July 21, 2006, to identify as much literature as possible. These included Biomed Central, BMJ.com, CINAHL, the Cochrane Library, Digital Dissertations, Google, NLM Central Gateway, PubMed/Medline, PEDro, PsycInfo, ScienceDirect, Web of Science, the *Australian Journal of Physiotherapy*, the *European Spine Journal, Physical Therapy, Spine*, the *Spine Journal* and *Pain*. All were available through the Stellenbosch University library except BMJ.com, PEDro, Google, NLM Central Gateway and the *Australian Journal of Physiotherapy*, which were accessed through the Internet.

As each database is different and has its own indexing terms and search functions, search strategies were developed after reviewing each database’s tutorial, where possible. Three groupings of databases were identified based on their search criteria:

- **Group 1**: Allowed only “simple search/quick search” with no advanced search features and included Digital Dissertations, Google, ScienceDirect, the *Australian Journal of Physiotherapy*, the *European Spine Journal, Physical Therapy, Spine*, the *Spine Journal* and *Pain*.

- **Group 2**: Allowed for advanced searches where words were combined and limitations set in relation to study types, titles-only, population, and language, and included Biomed Central, BMJ.com, CINAHL, the
Cochrane Library, NLM Central Gateway, PEDro, PsycInfo, and Web of Science.

- Group 3: The only database where papers were classified according to medical subject heading (MeSH) and had functions allowing them to be combined was PubMed/Medline.

Second, during the development of the search strategy, consideration was given to the terminology used to describe postoperative lumbar spine surgery rehabilitation consisting of exercise and/or education. Keywords identified for this review were advice, arthroplasty, cognitive, disc replacement, discectomy, education, exercise, instruction, laminectomy, postoperative, preoperative, rehabilitation, spine, spinal fusion, surgery and therapy. Words were either used in isolation or combined with “AND” in appropriate databases.

- Group 1: In databases that allowed only quick/simple searches, more specific terms were used, such as laminectomy or discectomy, thus refining the population to one surgical intervention at a time.

- Group 2: In databases that allowed advanced searches, keywords were combined with the “AND” function allowed by the search. Where available, keywords were further identified as titles, indicated by [TI].

- Group 3: Keywords were mapped into the medical subject headings (MeSHs) to find appropriate definitions applicable to the review; these were then combined with other keywords mapped in the MeSH headings.

The specific search strategies for each database are listed in Appendix 1.

The search strategy also included secondary searching, such as review of reference lists of included papers and systematic review of lumbar spine surgery. One author of an included article (Christensen 2003) was contacted
to request additional references, without success. The decision was made to conclude the search, as databases found towards the end duplicated all the articles found in earlier searches.

2.5 Search findings

Upon completion of the systematic review, all article titles were evaluated by the two reviewers (AL and QL) to determine their relevance to the study. Following this review, the remaining article abstracts were reviewed to determine if they met the inclusion criteria. After review of the abstracts, duplicates were removed to reveal all full-text articles needed.

<table>
<thead>
<tr>
<th>Databases</th>
<th>Number of hits</th>
<th>Journals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomed Central (n = 5)</td>
<td></td>
<td>Australian Journal of Physiotherapy (n = 11)</td>
</tr>
<tr>
<td>BMJ.com (n = 26)</td>
<td></td>
<td>European Spine Journal (n = 55)</td>
</tr>
<tr>
<td>CINAHL (n = 71)</td>
<td></td>
<td>Pain (n = 0)</td>
</tr>
<tr>
<td>Cochrane Library (n = 7)</td>
<td></td>
<td>Physical Therapy (n = 6)</td>
</tr>
<tr>
<td>Digital Dissertations (n = 11)</td>
<td></td>
<td>Spine (n = 82)</td>
</tr>
<tr>
<td>Google (n = 10)</td>
<td></td>
<td>The Spine Journal (n = 103)</td>
</tr>
<tr>
<td>NLM Central Gateway (n = 138)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PubMed (n = 93)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEDro (n = 30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PsycInfo (n = 0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ScienceDirect (n = 125)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web of Science (n = 21)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL HITS: (n = 794)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Number of hits on databases and journals

<table>
<thead>
<tr>
<th>Databases</th>
<th>Excluded Studies after Title Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomed Central (n = 5)</td>
<td>Australian Journal of Physiotherapy (n = 11)</td>
</tr>
<tr>
<td>BMJ.com (n = 26)</td>
<td>European Spine Journal (n = 53)</td>
</tr>
<tr>
<td>CINAHL (n = 71)</td>
<td>Pain (n = 0)</td>
</tr>
<tr>
<td>Cochrane Library (n = 7)</td>
<td>Physical Therapy (n = 6)</td>
</tr>
<tr>
<td>Digital Dissertations (n = 10)</td>
<td>Spine (n = 79)</td>
</tr>
<tr>
<td>Google (n = 10)</td>
<td>The Spine Journal (n = 100)</td>
</tr>
<tr>
<td>NLM Central Gateway (n = 129)</td>
<td><strong>TOTAL HITS EXCLUDED: (n = 707)</strong></td>
</tr>
<tr>
<td>PubMed (n = 93)</td>
<td><strong>TOTAL HITS EXCLUDED: (n = 707)</strong></td>
</tr>
<tr>
<td>PEDro (n = 30)</td>
<td><strong>TOTAL HITS EXCLUDED: (n = 707)</strong></td>
</tr>
<tr>
<td>PsycInfo (n = 0)</td>
<td><strong>TOTAL HITS EXCLUDED: (n = 707)</strong></td>
</tr>
<tr>
<td>ScienceDirect (n = 113)</td>
<td><strong>TOTAL HITS EXCLUDED: (n = 707)</strong></td>
</tr>
<tr>
<td>Web of Science (n = 21)</td>
<td><strong>TOTAL HITS EXCLUDED: (n = 707)</strong></td>
</tr>
</tbody>
</table>

Table 2: Excluded studies after title reviews
<table>
<thead>
<tr>
<th><strong>Databases</strong></th>
<th><strong>Journals</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomed Central (n = 0)</td>
<td><em>Australian Journal of Physiotherapy</em> (n = 0)</td>
</tr>
<tr>
<td>BMJ.com (n = 0)</td>
<td><em>European Spine Journal</em> (n = 2)</td>
</tr>
<tr>
<td>CiNAHL (n = 18)</td>
<td><em>Pain</em> (n = 0)</td>
</tr>
<tr>
<td>Cochrane Library (n = 2)</td>
<td><em>Physical Therapy</em> (n = 0)</td>
</tr>
<tr>
<td>Digital Dissertations (n = 1)</td>
<td><em>Spine</em> (n = 3)</td>
</tr>
<tr>
<td>Google (n = 0)</td>
<td><em>The Spine Journal</em> (n = 3)</td>
</tr>
<tr>
<td>NLM Central Gateway (n = 9)</td>
<td></td>
</tr>
<tr>
<td>PubMed (n = 18)</td>
<td></td>
</tr>
<tr>
<td>PEDro (n = 12)</td>
<td></td>
</tr>
<tr>
<td>PsycInfo (n = 0)</td>
<td></td>
</tr>
<tr>
<td>ScienceDirect (n = 12)</td>
<td></td>
</tr>
<tr>
<td>Web of Science (n = 7)</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL ARTICLES EXCLUDED: (n = 87)</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Total Possible Hits

<table>
<thead>
<tr>
<th><strong>Databases</strong></th>
<th><strong>Exclusion after Review of Abstracts</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CiNAHL (n = 18, financial review, no abstract available, not related to spine surgery, exercise-only with no education, editorials, not an RCT, not adults)</td>
<td></td>
</tr>
<tr>
<td>Cochrane Library (n = 1, financial review)</td>
<td></td>
</tr>
<tr>
<td>Digital Dissertations (n = 1, not an RCT)</td>
<td></td>
</tr>
<tr>
<td>NLM Central Gateway (n = 7, financial review, no abstract available, not related to spine surgery, exercise-only with no education, editorials, not an RCT, not adult population)</td>
<td></td>
</tr>
<tr>
<td>PubMed (n = 14, financial review, no abstract available, not related to spine surgery, exercise-only with no education, editorials, not an RCT, not adults)</td>
<td></td>
</tr>
<tr>
<td>PEDro (n = 8, not related to education, no abstract available, exercise-only study, exercise/education compared to surgery)</td>
<td></td>
</tr>
<tr>
<td>ScienceDirect (n = 10, financial review, no abstract available, not related to spine surgery, exercise-only with no education, editorials, not an RCT, not adults)</td>
<td></td>
</tr>
<tr>
<td>Web of Science (n = 5, case study, no rehab, scoliosis surgery, exercise vs. surgery)</td>
<td></td>
</tr>
<tr>
<td><strong>Journals:</strong></td>
<td></td>
</tr>
<tr>
<td><em>European Spine Journal</em> (n = 1, financial review)</td>
<td></td>
</tr>
<tr>
<td><em>Spine</em> (n = 3, no education, exercise-only, not RCT)</td>
<td></td>
</tr>
<tr>
<td><em>The Spine Journal</em> (n = 2, no education, cost review)</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL EXCLUDED: (n = 70)</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Reasons for exclusion after abstract review
Table 5: Total after review of abstracts

Total Articles: 17
Duplicates: 10
Total: 7
(1 article not found)

TOTAL: 6

In the total of six studies, one reported early (six-month; Ostelo, et al., 2003a) and later (12-month; Ostelo, et al., 2003b) results, thus leaving five different studies for review.

TOTAL: 5

Table 6: Total number of full-text articles for review

2.5.1 Assessment of methodological quality

The studies identified through the search process were independently assessed by two reviewers (AL and QL) against the inclusion criteria (type of study, language, patient population, intervention and outcome). The full-text versions of these studies were obtained. Inclusion of studies in this review was decided by consensus between the reviewers. Findings were entered into a Microsoft Excel database (Appendix 2).
2.5.1.1 Data Extraction Sheets
All included studies were analyzed using data extraction sheets to systematically catalog the following data:
- Author
- Journal
- Year
- Country
- Method of study
- Setting
- Participants
- Number of participants per intervention or control group
- Description of each intervention
- Whether interventions were adequate
- Outcome measures and their scales
- Continuous data comparing outcomes in treatment and control groups
(Data extraction sheets for the six full-text studies can be found in Appendix 3.)

2.5.1.2 Critical Appraisal of Evidence of Effectiveness
To evaluate the quality of evidence, each study was critically appraised by the two reviewers (AL and QL). Disagreements were resolved by discussion to reach consensus. The appraisal tool used was the National Health and Medical Research Council (NH&MRC) scale (see Appendix 4).

This appraisal tool was a modification of one used by PEDro (1999) and Law, et al., (1998). PEDro (1999) has been proven to have good reliability (Maher, et al., 2003), and the amendments added additional information derived from the Law tool. Blinding and concealment were removed from the scale, as they were not adequate to the reviewed literature. Consequently, the adapted version was equivalent to the PEDro and the Law, a critical review form for quantitative studies. It contains 11 points, equally weighted, each answered by yes or no, with yes allocated one point and no allocated zero. With this modification, an adequate and valuable assessment of the methodological quality of the reviewed literature was aimed for.
2. 6. RESULTS

2.6.1 Search Results
The extensive search yielded 794 hits. After the removal of duplicate titles and articles that did not meet the inclusion criteria, the full-text versions of six articles were reviewed. This systematic review was the analysis of six RCTs conducted in the Netherlands, the United Kingdom, Turkey, New Zealand and Denmark. There was 100% agreement between the two reviewers (AL and QL) for the studies included in this review.

2.6.1.1 Hierarchy of Evidence
There was 100% agreement between the reviewers regarding the types of study designs used in the included studies. All included studies were randomized controlled trials. The evidence from the studies was assessed using the National Health and Medical Research Council (NH&MRC) scale of Hierarchy of Evidence 2002 (Appendix 4). All the studies were classified as level II by the NHMRC since they were all randomized controlled trials.

2.6.1.2 Critical Appraisal findings
There was 100% agreement between the reviewers regarding the methodological quality of the included studies, which ranged from fair to moderate, with the average score being 7.67 out of a total of 11. Ostelo, et al., produced the highest-quality study, scoring 10 out of 11, whereas Christensen, et al., produced the lowest score, 4 out of 11 (Table 7).
Table 7: Critical Appraisal

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Was the assignment to the treatment groups random?</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2. Were participants blinded to treatment allocation?</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3. Was allocation to treatment groups concealed from the allocator?</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4. Were the outcomes of people who withdrew described and included in the analysis?</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5. Were those assessing the outcomes blind to treatment allocation?</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6. Were control and treatment groups comparable at entry?</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>7. Were groups treated identically other than for the named interventions?</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>8. Were outcomes measured in the same way for all groups?</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>9. Were outcomes measured in a reliable way?</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>10. Was there adequate follow-up of participants? (&gt; 80%)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>11. Was appropriate statistical analysis used?</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total (out of 11)</strong></td>
<td><strong>10</strong></td>
<td><strong>10</strong></td>
<td><strong>8</strong></td>
<td><strong>7</strong></td>
<td><strong>7</strong></td>
<td><strong>4</strong></td>
<td></td>
</tr>
</tbody>
</table>
2.6.1.3 Participants

Five of the studies included in this review included postdiscectomy rehabilitation, of which four were described as traditional discectomy (Ostelo, et al., 2003a and 2003b; Donaldson, et al., 2006; Filiz, et al., 2005) and one as a microdiscectomy (Dolan, et al., 2000). The only nondiscectomy study included spinal fusion patients (Christensen, et al., 2003). All populations were adult and varied in age from 18 to 65 years. All studies included male and female participants. All authors described patient populations in detail, referring to surgical intervention, age range and gender.

<table>
<thead>
<tr>
<th>Author</th>
<th>Surgery Type</th>
<th>Age Range</th>
<th>Male and Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ostelo, et al., 2003a</td>
<td>Discectomy</td>
<td>18–65 years</td>
<td>✓</td>
</tr>
<tr>
<td>Ostelo, et al., 2003b</td>
<td>Discectomy</td>
<td>18–65 years</td>
<td>✓</td>
</tr>
<tr>
<td>Donaldson, et al., 2006</td>
<td>Discectomy</td>
<td>17–65 years</td>
<td>✓</td>
</tr>
<tr>
<td>Filiz, et al., 2005</td>
<td>Discectomy</td>
<td>20–50 years</td>
<td>✓</td>
</tr>
<tr>
<td>Dolan, et al., 2000</td>
<td>Microdiscectomy</td>
<td>18–60 years</td>
<td>✓</td>
</tr>
<tr>
<td>Christensen, et al., 2003</td>
<td>Spinal Fusion</td>
<td>24–60 years</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 8: Participants of Postoperative Rehabilitation

2.6.1.4 Types of interventions

All patients received a postoperative rehabilitation program within the first four weeks after surgery, except Dolan, et al., who started interventions six weeks postsurgery. Many different postoperative interventions were utilized, and Table 9 provides a summary of the postoperative management utilized by each author.
### Table 9: Postoperative Rehabilitation

<table>
<thead>
<tr>
<th>Author</th>
<th>Control Group Treatment</th>
<th>Intervention Group Treatment #1</th>
<th>Intervention Group Treatment #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ostelo, et al., 2003 a</td>
<td>Usual care of postoperative patient with no behavioral graded activities, acupuncture or osteopathic techniques</td>
<td>Behavioral graded activities individualized to each patient to decrease fear and anxiety</td>
<td></td>
</tr>
<tr>
<td>Ostelo, et al., 2003 a</td>
<td>Usual care of postoperative patient with no behavioral graded activities, acupuncture or osteopathic techniques</td>
<td>Behavioral graded activities individualized to each patient to decrease fear and anxiety</td>
<td></td>
</tr>
<tr>
<td>Donaldson, et al., 2006</td>
<td>Advice on resuming normal activities as soon as pain allows</td>
<td>Progressive gym program</td>
<td></td>
</tr>
<tr>
<td>Filiz, et al., 2005</td>
<td>No formal exercise or education. Advice on activities of daily living</td>
<td>Back school and intensive exercise</td>
<td>Back school and a home exercise program</td>
</tr>
<tr>
<td>Dolan, et al., 2000</td>
<td>Normal postoperative care and advice on exercise by a physiotherapist</td>
<td>Normal postoperative care and advice on exercise by a physiotherapist and supervised exercise</td>
<td></td>
</tr>
<tr>
<td>Christensen, et al., 2003</td>
<td>Outpatient physiotherapy exercise program</td>
<td>Viewing of exercise video and one-time instruction by a physiotherapist</td>
<td>Viewing of exercise video, one-time instruction by a physiotherapist, and group meetings with fusion patients and a physiotherapist</td>
</tr>
</tbody>
</table>

All the interventions were provided in different dosages, timing and methods of delivery, which are described below in Table 10.
### Preoperative Education for Lumbar Spine Surgery

<table>
<thead>
<tr>
<th>Author</th>
<th>Description of Intervention</th>
<th>Program Frequency</th>
<th>Duration</th>
<th>Delivery Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ostelo, et al., 2003a and 2003b</td>
<td>Usual care of postoperative patient with no behavioral graded activities, acupuncture or osteopathic techniques</td>
<td>Not stated</td>
<td>Average of 15.5 visits</td>
<td>Physiotherapy one-on-one</td>
</tr>
<tr>
<td>Ostelo, et al., 2003a and 2003b</td>
<td>Behavioral graded activities individualized to each patient to decrease fear and anxiety</td>
<td>Not stated</td>
<td>Average of 14.8 visits</td>
<td>Physiotherapy one-on-one</td>
</tr>
<tr>
<td>Donaldson, et al., 2006</td>
<td>Advice on resuming normal activities as soon as pain allows</td>
<td>One visit</td>
<td>One day</td>
<td>Not stated</td>
</tr>
<tr>
<td>Donaldson, et al., 2006</td>
<td>Progressive gym program in three phases: conditioning, hypertrophy and strength</td>
<td>Not stated</td>
<td>Six months</td>
<td>Physiotherapy one-on-one</td>
</tr>
<tr>
<td>Filiz, et al., 2005</td>
<td>Back school</td>
<td>Twice a week</td>
<td>Two weeks</td>
<td>Physician one-on-one</td>
</tr>
<tr>
<td>Filiz, et al., 2005</td>
<td>Intensive exercise program</td>
<td>Three times a week</td>
<td>Eight weeks</td>
<td>Physiotherapy department</td>
</tr>
<tr>
<td>Filiz, et al., 2005</td>
<td>Home exercise program</td>
<td>Twice a week</td>
<td>Two weeks; weekly follow-up by phone</td>
<td>Physician and physiotherapy department</td>
</tr>
<tr>
<td>Filiz, et al., 2005</td>
<td>Advice on activities of daily living</td>
<td>One visit</td>
<td>One day</td>
<td>Surgeon one-on-one</td>
</tr>
<tr>
<td>Dolan, et al., 2000</td>
<td>Normal postoperative care and advice on exercise by a physiotherapist and supervised exercise</td>
<td>Twice a week</td>
<td>Four weeks</td>
<td>Physiotherapist one-on-one</td>
</tr>
<tr>
<td>Dolan, et al., 2000</td>
<td>Normal postoperative care and advice on activities of daily living</td>
<td>One visit</td>
<td>One day</td>
<td>Physiotherapist one-on-one</td>
</tr>
<tr>
<td>Christensen, et al., 2003</td>
<td>Outpatient physiotherapy</td>
<td>Twice a week</td>
<td>Eight weeks</td>
<td>Physiotherapist one-on-one</td>
</tr>
<tr>
<td>Christensen, et al., 2003</td>
<td>Viewing of exercise video</td>
<td>One visit</td>
<td>One day</td>
<td>Exercise video</td>
</tr>
</tbody>
</table>
Table 10: Treatment, dosage, frequency and delivery method

Only two studies described specific interventions in detail. Cognitive behavioral graded activities (BGA) were described in detail by Ostelo, et al., by determining each patient's exercise routine combined with information, reassurance and guidance. Donaldson, et al., describe in detail a six-month gym routine in the exercise group including each of the three phases – conditioning, hypertrophy and strengthening.

Most of the interventions mentioned in the studies were not described in detail by the authors. Ostelo, et al., describe “usual care” of postoperative physiotherapy as physiotherapy without BGA, acupuncture or osteopathic techniques, but do not describe the content of the physiotherapy interventions in the “usual care” group. Christensen, et al. describes two groups of patients (video and café groups) who received an exercise video and one session of instruction by a physiotherapist, but does not describe what the instruction consisted of – if the patients were observing the physiotherapist or if they actually performed the exercises. The third group in the Christensen study, the exercise group, received “exercise without education” but the authors did not describe the exact content, dosage or progression of the exercises. Donaldson, et al. describes “advice on resuming normal activities as pain allows,” but fail to describe the exact content of the advice or the procedure for delivering it to patients. Filiz, et al., as with Christensen, et al., describe “back school education” and home exercise programs without describing the education content or whether patients performed any of the home exercises while supervised or were just shown them by a physiotherapist. Dolan, et al.,
describe an intervention of “physiotherapist guided advice on daily activities” without describing the educational delivery method or content; nor is the exercise group’s four weeks of supervised exercise described in terms of content, progression or dosage.

2.6.1.5 Outcomes

Each of the authors used different outcome measures and scales to measure the effectiveness of their interventions. Those encountered in postoperative lumbar spine surgery are listed in Table 11.

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<tbody>
<tr>
<td>Pain</td>
<td>Visual Analog</td>
<td>X</td>
<td>X</td>
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<td>X</td>
</tr>
<tr>
<td>Disability</td>
<td>Low Back Rating Scale</td>
<td>X</td>
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<tr>
<td></td>
<td>Modified Oswestry</td>
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<td></td>
<td>Oswestry</td>
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<td></td>
<td>Roland Morris</td>
<td>X</td>
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<tr>
<td></td>
<td>Global Perceived Effort</td>
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<td></td>
<td>Low Back Outcome Scale</td>
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<td>X</td>
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<tr>
<td>Time off work</td>
<td>Patient log</td>
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<td>X</td>
<td>X</td>
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<tr>
<td>Back muscle endurance</td>
<td>Electromyography</td>
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<td></td>
<td>Biering-Sorensen test</td>
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<td>X</td>
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<tr>
<td>Catastrophisation</td>
<td>Pain catastrophisation</td>
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<td>X</td>
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<tr>
<td>Range of motion</td>
<td>Cybex</td>
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<td>X</td>
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<tr>
<td>Back muscle strength</td>
<td>Progressive isoinertial lifting</td>
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<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Depression</td>
<td>Back Depression Inventory</td>
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<td>X</td>
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<tr>
<td></td>
<td>Zung Depression</td>
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<td>X</td>
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<tr>
<td>Fear of movement</td>
<td>TampaScale</td>
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<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Preoperative Education for Lumbar Spine Surgery

The most commonly measured outcomes were pain (Filiz, et al., 2005; Ostelo, et al., 2003a and 2003b; Donaldson, et al., 2006; Christensen, et al., 2003) and disability (Filiz, et al., 2005; Ostelo, et al., 2003a and 2003b; Donaldson, et al., 2006; Christensen, et al., 2003). Difficulty exists when attempting to combine the results, as all the studies in this review used different outcome measures and different instruments to measure the outcomes. Several of the authors describe their outcome instruments and validation, yet there seems to be no clear set of agreed-upon outcomes among all the authors, which makes it difficult to combine these studies for a meta-analysis. Measurement of outcomes varied from immediate postoperative (Ostelo, et al., 2003a) to two-year follow-up (Christensen, et al., 2003).

2.6.1.6 Effectiveness of Interventions

Each author (except Ostelo, et al., 2003a 2003b, which was the same study reporting short- and long-term results) used different outcome measures and different scales, which made it difficult to combine the results from the studies.

2.6.1.6.1 Ostelo, et al., 2003a (six-month follow-up)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Scale</th>
<th>Results</th>
<th>Main Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Visual Analog Scale</td>
<td>“Main complaint” pain decreased 30.3 points for the usual care (UC) group, while the behavioral graded activity (BGA) group’s pain score decreased by 32.3 points. For back pain, the UC group had greater relief than the BGA</td>
<td>Statistically no difference between the education-and-exercise and exercise-only groups</td>
</tr>
</tbody>
</table>
group, with a decrease of 16 points compared to 9.3 points. For sciatica, the UC group had decreased pain levels of 14.2 points, compared to the BGA group’s 11.6 points.

<table>
<thead>
<tr>
<th>Disability</th>
<th>Roland Morris RDQ scores improved 5.6 points for the UC group versus 5.2 points for the BGA group.</th>
<th>Statistically no difference between the two groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disability</td>
<td>Global Perceived Effort 67% of the UC group rated themselves as “recovered” versus 48% of the BGA group.</td>
<td>Favors exercise-only approach</td>
</tr>
<tr>
<td>Fear of movement</td>
<td>Tampa Scale Tampa scale scores decreased by 0.7 points for both UC and BGA groups.</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>Psychological</td>
<td>Pain catastrophisation The UC group’s pain catastrophisation scores decreased by 1.9 points compared to the BGA group’s 2.9 points.</td>
<td>Favors exercise-and-education approach</td>
</tr>
<tr>
<td>Range of motion</td>
<td>Cybex ROM increased in both groups by the same amount, 12.7 degrees.</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>General health</td>
<td>SF 36 form The UC group increased its SF-36 score by 2.9 points, compared to the BGA group’s 0.7 points.</td>
<td>Favors the exercise-only group</td>
</tr>
<tr>
<td>Social function</td>
<td>SF 36 form – subscale For social functioning, the BGA group outscored the UC group with 19.5 points compared to 18.3 points.</td>
<td>Statistically, no difference between the two groups</td>
</tr>
</tbody>
</table>

Table 12: Ostelo, et al., six-month follow-up

Ostelo, et al., 2003a, in the delivery of the short-term (six-month) results of behavioral graded activities versus usual care, showed no difference in regards to functional status, pain, pain catastrophisation, fear of movement, range of motion, general health, social functioning or return to work. The original hypothesis that educating the BGA group and addressing their fears would lead to better outcomes than the UC group did not occur.
Table 13: Ostelo, et al., 12-month follow-up

As with the first reported short-term (six-month) results following discectomy, the differences between the two groups were negligible at 12-month follow-up.
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Scale</th>
<th>Results</th>
<th>Main Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return to work</td>
<td>Log</td>
<td>The intensive exercise group (IEG) returned to work after 56.07 days, compared to 75.00 days for the classic exercise group (CEG) and 86.25 for the control group (CG).</td>
<td>Favors the intensive exercise-and-education group</td>
</tr>
<tr>
<td>Range of motion</td>
<td>Schober Test</td>
<td>The IEG increased its ROM by 1.35 cm, compared to the CEG’s 1.28 cm and the CG’s 0.5 cm.</td>
<td>Favors both exercise-and-education groups</td>
</tr>
<tr>
<td>Pain</td>
<td>Visual Analog Scale</td>
<td>Pain ratings decreased as follows: IEG, 16 points; CEG, 10 points; and CG, 11.5 points.</td>
<td>Favors the intensive exercise-and-education group</td>
</tr>
<tr>
<td>Lifting</td>
<td>Progressive Isoinertial Lifting Evaluation</td>
<td>For lifting weight from floor to waist, the IEG increased by 6.25 kg; the CEG, 6.63 kg; and the CG, 3.38 kg.</td>
<td>Favors both exercise-and-education groups</td>
</tr>
<tr>
<td>Lifting</td>
<td>Progressive Isoinertial Lifting Evaluation</td>
<td>For lifting weight from waist to shoulder, the IEG increased by 4.87 kg; the CEG, 4.37 kg; and the CG, 3.25 kg.</td>
<td>Favors both exercise-and-education groups</td>
</tr>
<tr>
<td>Back endurance</td>
<td>Electromyography</td>
<td>Back endurance increased for the IEG by 195.5 seconds, compared to the CEG’s 110.4 seconds and the CG’s 37.1 seconds.</td>
<td>Favors the intensive exercise-and-education group</td>
</tr>
<tr>
<td>Abdominal endurance</td>
<td>Electromyography</td>
<td>Abdominal muscle endurance increased by 154.25 seconds for the IEG and 73 seconds for the CEG, and decreased by 20.1 seconds for the CG.</td>
<td>Favors the intensive exercise-and-education group</td>
</tr>
<tr>
<td>Disability</td>
<td>Modified Oswestry</td>
<td>Disability indexes decreased as follows: IEG, 12 points; CEG, 6.6 points; and CG, 4.35 points.</td>
<td>Favors the intensive exercise-and-education group</td>
</tr>
<tr>
<td>Depression</td>
<td>Back Depression Inventory</td>
<td>The IEG’s score decreased by 4.55 points, CEG’s by 2.3 points and CG’s by 2 points.</td>
<td>Favors the intensive exercise-and-education group</td>
</tr>
<tr>
<td>Disability</td>
<td>Low Back Pain Rating Scale</td>
<td>Scores for disability decreased by 33.8 points for the IEG, 21.2 for the CEG and 4.3 for the CG.</td>
<td>Favors the intensive exercise-and-education group</td>
</tr>
</tbody>
</table>
Filiz, et al. (2005) examined the effectiveness of two educational/exercise interventions compared to usual care with no education and no exercise. Group one, the “classical exercise group” (CEG), received back school education and a home exercise program (HEP), while an “intensive exercise group” (IEG) received the same back school education with an added exercise program three days per week for eight weeks. In all categories, the intensive exercise group had better results than the conventional exercise group or the control group. Of all the outcome measures, the biggest advantages of the intensive exercise group over the conventional exercise group control group were in lifting from waist to shoulder, abdominal endurance, and disability as measured by the modified Oswestry Disability Index.

2.6.1.6.4 Donaldson, et al., 2006

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Scale</th>
<th>Results</th>
<th>Main Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function and disability</td>
<td>Oswestry</td>
<td>No significant difference between control group (CG) and therapy group (TG) (p = .90)</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>Psychological well-being</td>
<td>Roland Morris</td>
<td>No significant difference occurred between CG and TG (p = .83)</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>Time off work</td>
<td>SF 36-Item Health Survey</td>
<td>No significant difference occurred between CG and TG (p = .19)</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>Number of therapy and doctor visits</td>
<td>Log</td>
<td>Eight CG participants visited their general practitioner 14 times. Two TG participants visited their general practitioner five times.</td>
<td>Favors the therapy (exercise-only) group</td>
</tr>
</tbody>
</table>

Table 15: Donaldson, et al., 2006

Donaldson, et al., compared a treatment group in an intensive six-month gym program in three phases to a control group who received advice on resuming normal activities as pain allowed in patients following lumbar discectomy. Patients in both groups made significant improvement after one year. No statistical difference was found between the two groups one year after surgery.
in relation to disability, pain or general health. The only differences found were fewer days off work and a seven-day-earlier return to work for the treatment group as compared to the control group.

2.6.1.6.5 Dolan, et al., 2000

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Scale</th>
<th>Results</th>
<th>Main Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Visual Analog Scale</td>
<td>No statistical difference in between EG and CG (P = 0.08)</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>Disability</td>
<td>Low Back Outcome Score</td>
<td>Scores at 12 months were significantly higher for the EG compared to the CG, with all but one EG patient obtaining a score of 74 or 75, while the CG’s average score was 57.</td>
<td>Favors the exercise-only group</td>
</tr>
<tr>
<td>Psychological</td>
<td>Multidimensional Health Q</td>
<td>Little change was found between the EG and CG after 12 months.</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>Psychological</td>
<td>Zung Depression Scale</td>
<td>Little change was found between the EG and CG after 12 months.</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>General health</td>
<td>Modified Somatic Perception</td>
<td>Little change was found between the EG and CG after 12 months.</td>
<td>No difference between the two groups</td>
</tr>
<tr>
<td>Posture</td>
<td>3-Space Isotrak</td>
<td>The EG showed significant improvement in lumbar side bend as compared to the CG.</td>
<td>Favors the exercise-only group</td>
</tr>
<tr>
<td>Muscle fatigue</td>
<td>Electromyography and Bjering-Sorensen test</td>
<td>At 12 months, the EG showed improvement in all tests/categories of endurance as compared to the CG.</td>
<td>Favors the exercise-only group</td>
</tr>
</tbody>
</table>

Table 16: Dolan, et al., 2000
Dolan, et al., randomized patients six weeks after microdiscectomy into an exercise group and a control group. Each group received physiotherapy guided advice and education on activities of daily living, and the exercise group also attended a four-week program of supervised physiotherapy exercises. The exercise group performed better in all but one category in regards to pain scores, disability, range of motion, back muscle endurance and fatigue at 12-month follow-up. In regards to psychometric scores measuring depression, somatic perception and health perception, there was no difference between the two groups.

2.6.1.6.6 Christensen, et al., 2003

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Scale</th>
<th>Results</th>
<th>Main Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Low Back Pain Rating Scale</td>
<td>At two-year follow-up, the café group and video group scored significantly lower leg pain than the training group (worst pain: $P &lt; 0.008$; mean pain: $P &lt; 0.03$), while there was no significant difference in back pain.</td>
<td>Favors the education-and-social-support and the exercise-and-education groups</td>
</tr>
<tr>
<td>Psychological</td>
<td>Modified Oswestry</td>
<td>At two-year follow-up, the café group scored better than the video group and training group in daily function ($P &lt; 0.01$).</td>
<td>Favors the exercise-and-education group</td>
</tr>
</tbody>
</table>

Table 17: Christensen, et al., 2003

In the only non-discectomy study, a study on patients who had undergone spinal fusion, Christensen, et al., compared three treatment groups – a video group, who received an exercise video and one session of instruction by a physiotherapist; a café group, who received a video and instructions similar to those for the video group and also met for four sessions with other spinal fusion patients and a physiotherapist to address fears and concerns; and an exercise group, who received supervised exercises without any formal education session. At two-year follow-up, the video and café groups scored lower leg pain as compared to the exercise group, but no significant differences in back pain. The café group had significantly better scores related
to some areas of function, such as carrying bags, rising from a chair and climbing stairs, as compared to the video and exercise groups. At two-year follow-up, all groups showed improvement in regards to psychosocial factors, with the exercise group slightly better than the video group. In relation to work and employment, the café group showed significant improvement as compared to the other groups. In just about all categories, the café group showed improvement when compared to the exercise and video groups.

2.7. Discussion
This is the first systematic review comparing education-and-exercise to exercise-only program outcomes related to pain and disability in lumbar spine surgery patients. The search strategy was both systematic and thorough, whereby primary and secondary searches were undertaken to locate published and unpublished evidence. The reviewers are confident that they have located the majority of the evidence on this topic, including hand searching and contacting an expert in the field.

The search was limited to randomized controlled trials published in the English language and pertaining to adult populations. A limitation of this review was that the reviewers were not blinded to the authors or the sources of the papers.

The heterogeneous nature of the studies prevents the results from being pooled in a meta-analysis. Consequently, the results were presented in a narrative summary. This review found that physiotherapy is used in postoperative rehabilitation for lumbar spine surgery patients. Treatment could consist of behavioral graded activities or usual postoperative physiotherapy with limitations (Ostelo, et al., 2003a 2003b), video instructions (Christensen, et al., 2003), instructions for home exercise programs (Christensen, et al., 2003; Filiz, et al., 2005; Dolan, et al., 2000), group meetings (Christensen, et al., 2003), exercise (Christensen, et al., 2003; Donaldson, et al., 2006; Filiz, et al., 2005; Dolan, et al., 2000) or no treatment at all (Filiz, et al., 2005; Donaldson, et al., 2006). Most of the studies lacked a clear description of their interventions, which makes it difficult to apply them to clinical practice; for
example, Ostelo, et al., did not describe “usual postoperative physiotherapy,” Christensen, et al., did not describe what the instructions consisted of in the video and control groups, and Donaldson, et al., described “advice on resuming normal activities as pain allows” but did not clarify the exact content of and procedure for delivering the advice to patients. For therapists developing treatment programs for postoperative patients, these vague descriptions are not helpful. A more clear description by researchers is needed to describe exact content, frequency, duration and timing of interventions used in clinical research in order to help with the clinical application of research results.

All six of the studies for this review contained some form of education-and-exercise component, varying from formal education (Ostelo, et al., 2003a and 2003b; Christensen, et al., 2003; Filiz, et al., 2004) with patients enrolled in programs with the main purpose of providing structured education in a lecture/presentation format to “advice/instruction” (Donaldson, et al., 2006; Dolan, et al., 2000) along with some form of exercise. Exercise interventions incorporated with education varied from home exercises (Filiz, et al., 2004) to intensive and specific exercises (Filiz, et al., 2004; Ostelo, et al., 2003a and 2003b; Donaldson, et al., 2006). The take-home message for clinicians would be that combining education with exercise is beneficial in decreasing pain and disability in patients who have undergone lumbar spine surgery. The exact application can vary from formal education or back school classes to education in a one-on-one format while a patient is performing exercises. It is important for clinicians to understand that teaching exercises and observing patients performing them is not a passive process, but can be enhanced with active instruction, addressing fears and concerns and setting goals.

It can be stated that, based on this review, there is evidence that education-and-exercise approaches decrease pain and disability in lumbar spine surgery patients. There are, however, conflicting results from the RCTs reviewed in regards to which approach is superior in outcomes: exercise-and-education or exercise-only? Ostelo, et al., and Donaldson, et al., showed no difference between education-and-exercise approaches and exercise-only approaches,
yet in both studies, patients in both groups made statistically significant progress. This would imply that therapists who choose an exercise-only program for their postoperative lumbar spine patients would have similar outcomes to therapists utilizing an exercise-and-education approach. Furthermore, these two studies would imply that exercise-and-education programs are not superior to education-only approaches, which would bring into question the added expense and resources spent on delivering treatments combining exercise and education compared to education only. It could further be stated that programs that contain behavioral-graded activities (Ostelo, et al., 2003a and 2003b) do not have better outcomes compared to approaches without behavioral-graded activities. Donaldson, et al., took patients through an elaborate six-month gym program in three phases, which showed no clear advantage to advice and basic exercises, bringing into question the time, effort and expense spent on an extensive exercise regimen.

In contrast to the studies by Ostelo, et al., and Donaldson, et al., the studies by Christensen, et al., Dolan, et al., and Filiz, et al., showed that exercise combined with education is superior to a program of exercise only in regards to pain, disability, strength, ROM and endurance. The study by Ostelo, et al., did not find an exercise-and-education approach to have a superior outcome over an approach of “usual care” physiotherapy following lumbar discectomy. It can, however, be argued that although the physiotherapy care did not have specific behavioral graded exercises, it would seem plausible that postoperative physiotherapy would include some form of education, some form of exercise, and some combination of exercise and instruction and/or advice. Therefore, in essence, Ostelo’s studies that find no significant difference between the two groups may have been comparing two exercise-and-education approaches and not an education-only approach. Donaldson, et al., disproved the hypothesis that a six-month gym program would be superior to advice (education) on resuming normal activities as pain allows. It can therefore be concluded that there is moderate evidence that education combined with an exercise program is effective in decreasing pain and disability in lumbar spine surgery patients.
Three forms of education delivery methods were clearly described. These consisted of one-on-one education between a health care provider and one patient (Ostelo, et al., 2003a and 2003b; Dolan, et al., 2000; Donaldson, et al., 2004), education in a group setting (Filiz, et al., 2005) and video (Christensen, et al., 2003). All the other studies describe education/advice/instruction provided to patients by health care providers. Not all the health care providers are identified, but several studies indicate physiotherapists (Ostelo, et al., 2003a and 2003b; Dolan, et al., 2000; Christensen, et al., 2003). Only the study by Filiz, et al., describes education in a group setting with patients attending back schools. It is also not clear from several of the studies if patients who received an exercise-and-education approach received education as a group. From this review it is shown that the majority of education was provided one-on-one by a health care provider, of which physiotherapists were in the majority. Christensen, et al., was the only study that used technology – an exercise video shown to spinal fusion patients – and then two of the groups received instruction by a physiotherapist.

2.8. Conclusion

Implications for clinical practice

Physiotherapy is a common intervention for post–lumbar spine surgery patients. The rationale for postoperative rehabilitation is to increase ROM, strength and endurance and to decrease pain, disability and fear. These postoperative approaches mainly consist of exercise or education in some form by itself or both combined (Ostelo, et al., 2003a and 2003b). There is, however, no current evidence implicating either the exercise-only or exercise-and-education approach as superior or showing whether a combined program of exercise and education is effective in reducing pain and disability. The results from this review indicate that exercise combined with education is able to decrease pain and disability in lumbar spine surgery patients. Furthermore, clinicians should be aware that education and information provided to patients before, during and after exercise interventions play a role in decreasing pain and disability. This education could be done by means of a formal program or
indirectly while a patient is exercising. This review further finds that education provided in a one-on-one setting by a physiotherapist seems to be the most beneficial delivery method. Surgeons, other referral sources and reimbursement sources should be made aware of the role of physiotherapy in education and exercise in post lumbar spine surgery patients.

**Implications for further research**
The results from this review highlight the limited information available on the topic of spinal surgery rehabilitation, and more research is needed in this field to justify clinical application of exercise and education. Additionally, researchers should strive to provide as much detail as possible on the interventions used in their studies. This would include dosage, content, delivery method, person(s) delivering the intervention(s), frequency, etc., which would make it easier not only to replicate in research but also to apply in clinical practice.
3. METHODOLOGY
This project proposal is presented in two sections. The first section describes the patient survey and the second section describes the physiotherapist survey.

3.1 Section 1

3.1.1 Study 1: Patient Survey

3.1.2 Objective
The aim was to determine the educational needs of patients undergoing spinal surgery for lumbar radiculopathy.

3.1.3 Study design: A cross-sectional survey was used to answer the research question.

3.1.4 Sample description
The study looked at patients who had undergone lumbar spinal surgery, including laminotomy, laminectomy and/or discectomy (or microdiscectomy) for lumbar radiculopathy. Male and female patients aged 20–65 years old, residing in the greater Kansas City metropolitan area (which spans the Missouri-Kansas state line and includes 15 surrounding counties), were recruited to participate in this study. This age group was selected because low back pain (LBP) is most prevalent in this group (Long, et al., 1996; Bogduk and Twomey 1997).

3.1.5 Sample size
Fifty-five patient questionnaires were collected between March 1, 2006, and September 15, 2006, with eight patients falling outside the inclusion criteria (seven due to age greater than 65 years and one who had cervical spine surgery), leaving 47 eligible patients. Originally, based on a review of surgical procedures by the Kansas City Neurosurgery group from the beginning of May 2005 until the end of June 2005, it was calculated that a typical surgeon performs approximately three laminectomies, laminotomies or discectomies.
per week. Thus, since three surgeons were participating in the study, it was estimated that 30 of the above-mentioned surgical procedures were performed per month, for a total of 90 surgeries in three months. By the end of May 2006, only 18 questionnaires were retrieved, and three changes were made. First, the timeframe for the study was extended to September 15, 2006, to obtain more patient questionnaires to be returned in time for statistical analysis. Second, additional surgeons were recruited as part of the study. Third, area physiotherapists treating immediate post-op lumbar spine patients were contacted by the researcher to assist in locating additional patients who met the inclusion criteria. Several factors resulted in a lower-than-expected return of patient questionnaires:

- Surgeon vacations: Several of the surgeons were on vacation for extended or multiple times, thus impacting the number of surgeries they performed.

- One surgeon handed out questionnaires to patients to complete at home, and the researcher and office personnel were unable to retrieve those questionnaires.

- One surgeon read patients’ replies following completion of the questionnaire and shredded some questionnaires.

- Several of the surgeons were busy with research on artificial disc replacement in the US and were not interested in participating in this study at this time.

- There was miscommunication between surgeons and their assistants. In some cases, surgeons agreed to have the study take place at their office and were under the impression their assistants were doing it, while in other cases assistants were waiting for direct instructions from surgeons.
• Several surgeons stated decreased case loads related to the lumbar spine surgeries described in this study and were performing unusually high numbers of other surgeries – fusions, neck surgeries or general orthopedic surgeries.

• Some surgeons never called back after being asked to participate in the study, while one additional surgeon contacted indicated he was now retired.

3.1.6 Subject recruitment
Patients were recruited from the Carondelet Orthopedics, Dickson Diveley Midwest Orthopedics and Kansas City Neurosurgery practice groups. The three selected practice groups have the highest number of orthopedic and neurosurgeons in Kansas City, which was the primary motivation for selecting these clinics. The researcher also works closely with the three surgeons at the selected clinics by providing physiotherapy services to their patients. At each clinic, the patients of only one spinal surgeon were invited to participate in this study. The three selected practice groups have six practice locations in the greater Kansas City metropolitan area. Three of the six practice locations were selected to represent different geographic areas of Kansas City and thereby ensured that the entire range of socioeconomic and geographic influences were represented. All three participating surgeons provided preliminary permission to conduct the study. A letter describing the study and formally seeking permission to conduct it was sent to the surgeons and practice managers upon approval of the proposal (Appendix 5).

Due to lower numbers of patient replies, additional surgeons were recruited within the Kansas City metropolitan area, also reflective of the different socioeconomic and geographic influences described in the study. Surgeons were chosen based on their performing the surgeries described in the study, personally agreeing with the researcher to participate in the study and practicing within the geographic area specified. In the end, three additional surgeons (one orthopedist and two neurosurgeons) agreed to participate in
the study – Kansas City Neurosurgery (downtown location), Kansas City Bone and Joint Surgery, and Bone and Joint Specialists (see Appendix 6 for agreement letters).

With one month left of data collection and persistently low numbers of patient questionnaires, it was decided to contact local physiotherapy directors and supervisors at large hospitals as well as private practices in the greater Kansas City metropolitan area reflective of the geographic choices in this study, to ask them to assist in data collection by administering questionnaires to patients who met the inclusion criteria. Five hospital and private practice directors or supervisors assisted in the collection of 10 additional patient questionnaires before September 15, 2006.

3.1.7 Inclusion criteria
The following patients were included:

- Patients who presented with a diagnosis of lumbar radiculopathy on the operative report (Appendix 7) due to disc herniation, nerve root irritation, cyst and/or congenital foraminal stenosis

- Patients who attended their first routine postoperative consultation with the surgeon in the first postsurgical month

3.1.8 Exclusion criteria
The following patients were excluded:

- Patients who were not fluent English speakers and required assistance with reading and writing in English

- Patients who had previous lumbar spine surgery; only those who had undergone one (this) surgical procedure were included, to keep a homogeneous group and to not influence the results based on previous surgeries.
• Geriatric patients above 65 years of age, since they have different educational needs due to the high prevalence of spinal stenosis (Fritz, et al., 1998) and other medical concerns such as diabetes or cardiothoracic conditions

• Patients younger than 20 years old, as they commonly do not undergo spinal surgery for radiculopathy (Lurie, et al., 2003)

• Patients who had undergone surgery for spinal stenosis, benign or malignant tumors, cord or cauda equina compression, or spondylolisthesis, as the research questions were based on lumbar radiculopathy and surgeries addressing pathologies other than lumbar radiculopathy fell outside the scope of this study

• Patients who had undergone surgical interventions such as spinal fusion, artificial disc replacement, nucleoplasty, vertebroplasty, intradiscal electrothermy (IDET) or instrumentation, as their postsurgical educational requirements are different from the selected population (Slosar and Scott 2001; Gibson, et al., 2004)

3.1.9 Instrumentation
A questionnaire was designed to serve as a measuring tool.

3.1.9.1 Questionnaire design
To determine the educational needs of the patients, the researcher conducted a review of electronic databases including Medline, PEDro, Cochrane, PubMed, OVID and other relevant websites. Three questionnaires on educational needs of patients (Macario, et al., 2003; Delameter, et al., 2001; Bailey 2004) were reviewed for content and format to assist in the design of the questionnaire for this study.

The researcher also conducted informal interviews with two spine surgeons, three physiotherapists and two surgical technicians to obtain information
regarding education delivery and frequently asked questions by patients pre- and postoperatively. Surgeons, therapists and technicians reported that patients were interested in issues related to the surgery; outcomes/pain relief; medical care associated with the surgery; and movement, recovery and postoperative physiotherapy. Information from the interviews was used to identify the five sections related to spinal surgery used in this study (section 3.1.9.2).

### 3.1.9.2 Questionnaire content and structure

The questionnaire was organized into three sections.

- **Section 1** provided the instructions on how to complete the questionnaire (Appendix 8).

- **Section 2** was designed to capture demographic information (Appendix 9).

- **Section 3** consisted of a series of 29 questions regarding educational needs, and these were divided into the following five categories (Appendix 10):

#### 3.1.9.2.1 Category 1: Surgical Procedure

Section 1 included information on anatomy, pathology and surgical technique (Macario, et al., 2003; Delameter, et al., 2001; Bailey, 2004).

#### 3.1.9.2.2 Category 2: Medical Care

Section 2 covered the medical issues regarding the surgery. These included blood transfusions, medication prior to surgery, instructions related to food and fluid intake prior to surgery, anesthesia, medical clearance from the primary care physician, hospital stay, the use of back braces postoperatively, and when the patient would see the surgeon after the operation (Macario, et al., 2003; Bailey 2004).
3.1.9.2.3 Category 3: Prognosis
Section 3 included information regarding recovery and prognosis. Questions in this section pertained to the status of pre- and postoperative pain, i.e., pain at the surgical site, pain “left over” after surgery, “new” pains, overall prognosis, and length of recovery (North American Spine Society 2005).

3.1.9.2.4 Category 4: Functional Activities and Restrictions
The questions in section 4 were aimed at assessing information regarding functional impairment with respect to driving, lifting, bending, sitting, transferring in and out of bed, and walking (Macario, et al., 2003; Delameter, et al., 2001; Bailey 2004). Questions pertaining to physiotherapy management were also included in this section.

3.1.9.2.5 Category 5: Educational Delivery Methods
Section 5 dealt with questions regarding the preferred education delivery method. The methods included one-on-one education (Wong and Wong 1985), group education (Christensen, et al., 2003), DVD and videos (Lin, et al., 1997), audiotapes and slides (Daltroy, et al., 1998), color pamphlets (Santavirta, et al., 1994), and websites (Macario, et al., 2003). Questions pertaining to the qualifications of the person delivering the questions were included in this section as well.

3.1.9.3 Questionnaire validity
To establish face and content validity, the questionnaire was sent to a panel of international experts in the field of spinal surgery rehabilitation, patient education and questionnaire design. The questionnaire was accompanied by the checklist (Appendix 11). Experts were asked to complete and return the checklist within 30 days of receiving it (Appendix 12). The experts identified to validate this questionnaire who returned their checklists were:
- Dr. Ina Diener, questionnaire development and implementation, South Africa
- Marina Wege, physiotherapist, spinal surgery rehabilitation. South Africa
- Dr. Karen Grimmer, research methodology, Australia
Upon completion of the review by the expert panel, changes were made to the questionnaire. The updated questionnaire was then distributed to a convenience sample of five patients who had had spinal surgery in the past three weeks and were presenting in the researcher’s physiotherapy clinic for rehabilitation. Patients were asked to review the questionnaire and provide feedback using the checklist on any unclear questions, ease of reading, format, content or any additional comments related to the questionnaire.

3.1.10 Data collection procedure
Patients were required to attend a routine follow-up visit with the surgeon one month postoperatively. Upon arrival, the surgical technician screened the surgery report containing the patient’s name, the date of the operation, the primary indication for surgery, the surgical intervention and a description of the complete surgical procedure (Appendix 7). Based on this information, eligible patients were invited to participate in this study. Patients who agreed to participate were asked to complete the questionnaire before or after they had consulted the surgeon. Completion of the questionnaire took approximately 10 minutes (Macario, et al., 2003). The completed questionnaire was then placed in a self-sealed envelope and handed to the administrative assistant upon leaving. The administrative assistant placed all sealed envelopes in a designated box marked by the researcher. The return box had a printed label on the outside with 30 check-off boxes for completed questionnaires. Originally it was planned that as soon as 30 questionnaires were returned and checked off, the administrative assistant was to call the researcher to collect the box and all remaining questionnaires. Due to the low number of returns, the researcher picked up questionnaires from each office at the end of each month of the collection period. Questionnaires were administered from March 1, 2006, to September 15, 2006. Collected questionnaires were examined for inclusion/exclusion criteria, numbered and catalogued accordingly, and recorded in an Excel spreadsheet for statistical analysis.
3.2 Section 2

3.2.1 Study 2: Physiotherapist survey

3.2.2 Objective
The aim was to determine the educational requirements physiotherapists identified as important for patients who had undergone spinal surgery for lumbar radiculopathy.

3.2.3 Study design: A cross-sectional survey was used to answer the research question.

3.2.4 Sample description
The study looked at registered male and female physiotherapists of all ages, with at least two years of clinical work experience, residing within the greater Kansas City metropolitan area. This population represented all registered and licensed physiotherapists in the area.

3.2.5 Sample size
The sample size was 1,000 physiotherapists. Three studies (Jette, et al., 2003; Riddle, et al., 2005; Kaminker, et al., 2005) sampled physiotherapists all over the United States, with response rates of returned questionnaires varying between 48.8% and 65%. Based on these return rates, it was estimated that 488 to 650 questionnaires would be returned, but due to further exclusion criteria, listed in section 3.2.8, it was anticipated that additional respondents would be excluded, thus lowering the eligible returns. The sample size was chosen to be comparable to that of the patient survey in section 3.1.

3.2.6 Subject recruitment
All physiotherapists involved in patient care at the time of the study were required to be licensed by the board of the state they were practicing in. Since Kansas City is a bi-state city (half in Missouri and half in Kansas), therapists are licensed by either the Kansas Board of Healing Arts, the Missouri State Board of Registration for the Healing Arts or both. At the time of the study, there were 1,758 therapists licensed in Kansas and 3,319 licensed in
Missouri. Database lists containing the names and addresses were purchased from the Missouri State Board of Registration for the Healing Arts and the Kansas Board of Healing Arts. The statistician randomly selected 500 therapists from each of the two selected states’ databases for this study (for a total of 1,000).

3.2.7 Inclusion criteria
The following physiotherapists were included:

- Physiotherapists licensed to provide patient care in the greater Kansas City metropolitan area
- Physiotherapists who were actively involved in treating postoperative spinal surgery patients at the time of the study

3.2.8 Exclusion criteria
The following physiotherapists were excluded:

- Physiotherapists who were not fluent English speakers or required assistance with reading and writing in English
- Physiotherapists who were not actively involved in treating spinal surgery patients at the time of this study
- Physiotherapists with less than two years of experience in clinical practice

3.2.9 Instrumentation
A questionnaire was developed by the researcher to serve as a measuring tool, as described in section 3.1.9. Question content remained the same. Therapists were asked to rate the importance of the questions being asked of their patients, based on their experience treating postoperative lumbar spine patients.
3.2.9.1 Questionnaire content and structure
The questionnaire instrument was organized into three sections:

- Section 1 was designed to capture demographic information. To ensure that therapists met the inclusion criteria, the demographic section was placed first in the questionnaire (Appendix 13). The demographic information section also surveyed therapists on their practice patterns regarding preoperative education for spinal surgery patients.

- Section 2 provided instructions to complete the questionnaire (Appendix 14).

- Section 3 utilized the same 29-question survey described in section 3.1.9.2 (Appendix 15).

3.2.9.2 Questionnaire validity
To establish face and content validity, the physiotherapist questionnaire was sent to a panel of international experts in the field of spinal surgery rehabilitation (described in section 3.1.9.3) and then to a convenience sample of five physiotherapists who treated postsurgical spine patients.

3.2.10 Data collection procedure
Each physiotherapist in the random sampling of 1,000 was mailed a letter describing the research study and seeking permission to participate in the study. The mailing included the actual questionnaire, including the introductory demographic information (Appendix 16). Therapists were asked to return the survey within 60 days, similar to the studies by Jette, et al., 2003; Riddle, et al., 2005; and Kaminker, et al., 2005. After 30 days, a postcard reminder (Appendix 17) was mailed to all participants thanking them for their participation and reminding them to return their questionnaires if they had not done so. Dillman (1978) and Aday (1996) have shown this process to be beneficial in increasing return rates of mailed surveys. Returned completed
questionnaires were tracked on the random sampling list. Originally it was planned that 15 days prior to the 60-day deadline, therapists who had not returned their questionnaires would be contacted by the researcher by phone to ask them to participate in the study and return the questionnaire before the deadline. This process never occurred, since the goal of at least 100 returns that met the inclusion criteria were returned by the deadline (225 total, with 141 meeting all the criteria) and the phone numbers were not provided to the researcher by the state boards. Questionnaires were returned to the researcher for data collection and analysis.
4. RESULTS
The results are reported according to the objectives and aims of the study.

4.1 Demographic data from the patient questionnaires
Fifty-five patient questionnaires was collected between March 1, 2006, and September 15, 2006, with eight patients falling outside the inclusion criteria (seven due to age greater than 65 years and one who had cervical spine surgery), thus leaving 47 eligible questionnaires for this study.

<table>
<thead>
<tr>
<th>Demographic area</th>
<th>Clinic</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>KC Neurosurgery</td>
<td>28</td>
</tr>
<tr>
<td>Central</td>
<td>KC Neurosurgery – Plaza</td>
<td>9</td>
</tr>
<tr>
<td>South</td>
<td>Orthopedic Institute Bone &amp; Joint Specialists KC Bone and Joint</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 18: Patient questionnaires per demographic area and clinic

4.1.1 Age
The average age of patients undergoing first-time lumbar spine surgery was 46.13 years (±10.92).

4.1.2 Sex
Twenty-six females (55%) and 21 males (45%) underwent spinal surgery.

4.1.3 Ethnicity
Forty-seven patients answered this question. Forty (85.11%) were Caucasian, followed by African American (6.37%), Hispanic (4.26%) and Asian (4.26%).

4.1.4 Type of surgery
The majority of patients (85.11%) were aware of the type of surgery they were undergoing. Of those 40 patients, the majority reported undergoing laminectomy combined with discectomy (45%), followed by laminectomy (25%), microdiscectomy (20%), discectomy (7.5%) and laminotomy (2.5%). Seven patients did not report the type of surgery they underwent.
4.1.5 Educational background

Forty-seven patients answered this question. More than half (51%) indicated high school as their highest attained education (Figure 1).

![Patient educational background](image)

Figure 1: Patient educational background

4.1.6 Income

Patients were asked to indicate which income bracket best described their income. Most (53%) earned $10,000 – $50,000 annually (Figure 2). Two patients did not respond to the question (n = 45).

![Annual income reported by patients](image)

Figure 2: Annual income reported by patients
4.2 Demographic data from the physiotherapist questionnaires
Two hundred and twenty-four physiotherapists returned their questionnaires within the designated period for the study. Of those 224, 141 studies met the inclusion criteria and formed the data for the physiotherapist study.

4.2.1 Age
The average age of the physiotherapists who provided care for patients who had undergone lumbar spine surgery was 41.65 years (±10.56).

4.2.2 Highest attained physiotherapy degree
Physiotherapists were asked to indicate their highest attained degree related to physiotherapy. One hundred and forty-one replied to this question. The majority (51%) indicated they received a master’s degree, followed by 43% having attained a bachelor’s degree and 6% a doctorate in physical therapy (DPT). One participant indicated PhD as the highest degree achieved.

4.2.3 Clinical experience
Therapists were asked to indicate how many years they had been practicing physiotherapy. One hundred and forty-one responded to this question. The mean years of clinical experience was 15.36 (±10.66).

4.2.4 Employment
Therapists were asked to indicate their status of employment. Of the 141 who answered the question, the majority were employed full-time (81%), followed by part-time (16%) and “as needed” (3%).

Additionally, therapists were given a series of employment settings and asked to indicate which they would classify as their primary setting of clinical practice. Physiotherapists working in private practice constituted the largest group. Almost three out of four therapists (73%) surveyed in this study practice in outpatient orthopedic environments (private practice, hospital outpatient departments and sports medicine clinics) (Figure 3).
4.2.5 Physiotherapists who had undergone spinal surgery themselves

Physiotherapists were asked to indicate if they had undergone lumbar spine surgery themselves. Four of the 141 therapists who answered the question (2.84%) indicated they had undergone spinal surgery.

4.2.6 Formal certification of physiotherapists

Physiotherapists were asked if they had attained any additional certification or specialization above and beyond their physiotherapy degree. Twenty-four percent indicated they had additional certifications (n = 34). Those were asked to indicate which certification they had received. Eleven percent (n = 16) indicated various forms of nonspecific certification. The largest formal certification was manual therapy (n = 12), accounting for 9% of the respondents, followed by certified strength and conditioning specialists (CSCS) (n = 4), orthopedic certified specialists (OCS) (n = 1), and geriatric certified specialists (GCS) (n = 1).

Figure 3: Practice setting of physiotherapists who treat spinal surgery patients
4.3 How patients regard the importance of preoperative education

One of the objectives of the study was to determine how important patients regard preoperative education to be for lumbar spine surgery. Several questions in the patient questionnaire were designed to measure that importance.

4.3.1 The importance of preoperative education

All patients (n = 47), when asked if they thought preoperative education was important for spinal surgery patients, indicated they thought it was important. Additionally, patients were asked to explain their answer. Main themes extracted from the patient answers included:

- “Better knowledge and understanding of the surgical procedure and be better prepared.”
- “Increased knowledge of what to expect during and after surgery.”
- “Need to know the risks associated with the surgery.”
- “Decreased anxiety and fear.”
- “Need to be aware of limitations and activities after surgery.”

Table 19: Main themes extracted from patients regarding the importance of preoperative education

In the four patient questionnaires categories (surgical procedure, medical care, prognosis/symptoms/recovery and activities/physical therapy), patients were asked to rate, on a scale of 0–100, the importance of questions being asked. Overall, the average score of the four categories was 82.51 out of 100, indicating the relative importance of questions being asked prior to lumbar spine surgery (Table 20).

<table>
<thead>
<tr>
<th>Section</th>
<th>Average score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical procedure</td>
<td>90.41</td>
</tr>
<tr>
<td>Prognosis, symptoms and recovery</td>
<td>86.27</td>
</tr>
<tr>
<td>Activity, mobility and physical therapy</td>
<td>82.80</td>
</tr>
<tr>
<td>Medical care</td>
<td>70.56</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>82.51</strong></td>
</tr>
</tbody>
</table>

Table 20: Average patient scores per section
4.3.2 Benefit of preoperative education
Forty patients (85.11%) who had undergone lumbar spine surgery indicated that they received some form of preoperative education. Thirty-nine (97.5%) of those patients thought it was beneficial (Figure 4 below).

![Figure 4: The benefit of preoperative education for patients](image)

In section 6 of the patient questionnaire (pain), patients were asked if they thought the information provided to them regarding postoperative pain was sufficient. Thirty-seven percent indicated they did not receive sufficient education regarding postoperative pain prior to surgery.

4.4 The information patients and therapists rate as important
One of the main objectives of the study was to determine which information patients and therapists rate as most important for patients undergoing lumbar spine surgery.
4.4.1 Surgical procedure

Patients and therapists were asked to indicate, on a scale of 0–100, the importance of questions related to the surgical procedure being asked before undergoing lumbar spine surgery (Table 21).

<table>
<thead>
<tr>
<th>Topic</th>
<th>Patient Mean Score</th>
<th>Therapist Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Reason for surgery?</td>
<td>94.04</td>
<td>92.00</td>
</tr>
<tr>
<td>1.2 Risks with surgery?</td>
<td>93.23</td>
<td>93.74</td>
</tr>
<tr>
<td>1.3 Alternative to the surgery?</td>
<td>88.66</td>
<td>93.25</td>
</tr>
<tr>
<td>1.4 Surgical procedure?</td>
<td>85.72</td>
<td>75.82</td>
</tr>
</tbody>
</table>

Table 21: Mean scores of patients and therapists in regards to surgical procedure in lumbar spine surgery

4.4.1.1 Alternatives to surgery

When reviewing the results from therapists, there was a statistically significant difference ($p = 0.03$) between therapists working in an inpatient environment compared to outpatient therapists in relation to alternatives to the surgical procedure (Figure 5).

![Graph showing comparison of inpatient and outpatient therapists in relation to alternatives to surgery](image)

Figure 5: Comparison of inpatient and outpatient therapists in relation to alternatives to surgery
4.4.2 Medical care

Patients and therapists were asked to indicate, on a scale of 1–100, the importance of questions related to the medical care being asked before undergoing spinal surgery (Table 22).

<table>
<thead>
<tr>
<th>Topic</th>
<th>Patient Mean Score</th>
<th>Therapist Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Length of anesthesia?</td>
<td>64.75</td>
<td>64.87</td>
</tr>
<tr>
<td>2.2 Stop taking medication?</td>
<td>77.13</td>
<td>89.11</td>
</tr>
<tr>
<td>2.3 Length of hospital stay?</td>
<td>70.55</td>
<td>73.48</td>
</tr>
<tr>
<td>2.4 Needing a back brace?</td>
<td>65.51</td>
<td>81.83</td>
</tr>
<tr>
<td>2.5 Seeing the surgeon?</td>
<td>74.91</td>
<td>79.89</td>
</tr>
</tbody>
</table>

Table 22: Mean scores of patients and therapists concerning medical care in lumbar spine surgery

4.4.2.1 Follow-up with the surgeon following surgery

In the topics related to medical care, outpatient therapists scored a statistically significant (p = 0.03) higher importance for patients to know when they will see the surgeon for a follow-up visit, compared to inpatient therapists (Figure 6).
In the patient study, there was also a statistically significant difference ($p = 0.04$) between different income brackets related to the importance of seeing the surgeon following surgery. Patients in the lower income bracket ($10,000 – $50,000 per year) rated it much more important to know when they will see the surgeon than patients in the higher $50,000 – $100,000 per year group (Figure 7).

![Figure 7: Comparison of patient income and the importance of knowing when the patient will see the surgeon for a follow-up visit](image-url)
4.4.3 Prognosis, symptoms and recovery

Patients and therapists were asked to indicate, on a scale of 0–100, the importance of questions related to the prognosis, symptoms and recovery being asked before undergoing lumbar spine surgery (Table 23).

<table>
<thead>
<tr>
<th>Topic</th>
<th>Patient Mean Score</th>
<th>Therapist Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Preoperative pain?</td>
<td>89.91</td>
<td>88.30</td>
</tr>
<tr>
<td>3.2 Surgery site pain?</td>
<td>78.85</td>
<td>86.59</td>
</tr>
<tr>
<td>3.3 Other pain?</td>
<td>85.94</td>
<td>86.74</td>
</tr>
<tr>
<td>3.4 Complete loss of all pain?</td>
<td>90.39</td>
<td>87.02</td>
</tr>
</tbody>
</table>

Table 23: Mean scores of patients and therapists concerning prognosis, symptoms and recovery in lumbar spine surgery

In the section related to prognosis, symptoms and recovery, analysis of the subgroups of therapists revealed that therapists with less experience scored the importance of three (out of four) topics their patients should know statistically more significantly than therapists with more clinical experience (Figures 8, 9 and 10).

![Figure 8: Correlation between therapist experience and preoperative pain](image_url)
For the patient group, the older patients were the more concerned they were about the relief of pain they experienced preoperatively (p = 0.03) (Figure 11).
4.4.4 Activities, mobility and physical therapy

Patients and therapists were asked to indicate, on a scale of 0–100, the importance of questions related to activity, mobility and physical therapy care issues being asked preoperatively (Table 24). The highest-rated categories were similar between patients and therapists.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Patient Mean Score</th>
<th>Therapist Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 <strong>Back to work</strong> after surgery?</td>
<td>81.70</td>
<td>91.41</td>
</tr>
<tr>
<td>4.2 <strong>Start driving</strong> after surgery?</td>
<td>75.53</td>
<td>86.14</td>
</tr>
<tr>
<td>4.3 <strong>Any limitations</strong>?</td>
<td>91.49</td>
<td>94.12</td>
</tr>
<tr>
<td>4.4 <strong>Needing physical therapy</strong>?</td>
<td>88.68</td>
<td>89.42</td>
</tr>
<tr>
<td>4.5 Physical therapy <strong>content</strong>?</td>
<td>76.64</td>
<td>86.01</td>
</tr>
</tbody>
</table>

Table 24: Mean scores of patients and therapists concerning activities, mobility and physical therapy in lumbar spine surgery
4.4.4.1 Return to work

Patients in higher income brackets ($p = 0.02$) were more concerned about returning to work than lower income bracket patients (Figure 12).

![Figure 12: Return to work correlated to income](image-url)
4.5 Most important preoperative issues for patients

In order to determine the most important issues patients are interested in before undergoing lumbar surgery, all the subcategories were combined and ranked according to their mean score for the top 10 issues (Table 25).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Mean Score</th>
<th>Question Number</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>94.04</td>
<td>1.1</td>
<td>How important is it for you to know the exact reason for undergoing spinal surgery?</td>
</tr>
<tr>
<td>2</td>
<td>93.23</td>
<td>1.2</td>
<td>How important is it for you to know the risks associated with the surgery?</td>
</tr>
<tr>
<td>3</td>
<td>91.49</td>
<td>4.3</td>
<td>How important is it for you to know about any limitations about activities such as bending, lifting, walking and sitting?</td>
</tr>
<tr>
<td>4</td>
<td>90.39</td>
<td>3.4</td>
<td>How important is it for you to know how long it will take to experience complete loss of all pain?</td>
</tr>
<tr>
<td>5</td>
<td>89.91</td>
<td>3.1</td>
<td>How important is it for you to know how much pain before surgery will be gone after surgery?</td>
</tr>
<tr>
<td>6</td>
<td>88.68</td>
<td>4.4</td>
<td>How important is it for you to know if you will need physical therapy after surgery?</td>
</tr>
<tr>
<td>7</td>
<td>88.66</td>
<td>1.3</td>
<td>How important is it for you to know the alternative treatment options to the surgical procedure?</td>
</tr>
<tr>
<td>8</td>
<td>85.94</td>
<td>3.3</td>
<td>How important is it for you to know about any other pain you may experience after surgery?</td>
</tr>
<tr>
<td>9</td>
<td>85.72</td>
<td>1.4</td>
<td>How important is it for you to receive a detailed description or explanation of the exact surgical procedure?</td>
</tr>
<tr>
<td>10</td>
<td>81.70</td>
<td>4.1</td>
<td>How important is it for you to know when you can go back to work after surgery?</td>
</tr>
</tbody>
</table>

Table 25: Ranking of the 10 issues patients regard as most important preoperatively for lumbar spine surgery
### Most important preoperative issues for physiotherapists

In order to determine the most important issues therapists were interested in before their patients underwent lumbar surgery, all the subcategories were combined and ranked according to their mean score for the top 10 issues (Table 26).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Mean Score</th>
<th>Question Number</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>94.12</td>
<td>4.3</td>
<td>How important is it for your patient to know about any <strong>limitations</strong> about activities such as bending, lifting, walking and sitting?</td>
</tr>
<tr>
<td>2</td>
<td>93.74</td>
<td>1.2</td>
<td>How important is it for your patient to know the <strong>risks</strong> associated with the surgery?</td>
</tr>
<tr>
<td>3</td>
<td>93.25</td>
<td>1.3</td>
<td>How important is it for your patient to know the <strong>alternatives</strong> to the surgical procedure?</td>
</tr>
<tr>
<td>4</td>
<td>92.00</td>
<td>1.1</td>
<td>How important is it for your patient to know the <strong>reason</strong> for surgery?</td>
</tr>
<tr>
<td>5</td>
<td>91.41</td>
<td>4.1</td>
<td>How important is it for your patient to know when they can <strong>return to work</strong> after surgery?</td>
</tr>
<tr>
<td>6</td>
<td>89.42</td>
<td>4.4</td>
<td>How important is it for your patient to know if he or she will <strong>need physical therapy</strong> after surgery?</td>
</tr>
<tr>
<td>7</td>
<td>89.11</td>
<td>2.2</td>
<td>How important is it for your patient to know when to <strong>stop medication</strong> prior to surgery?</td>
</tr>
<tr>
<td>8</td>
<td>88.31</td>
<td>3.1</td>
<td>How important is it for your patient to know how much <strong>pain before surgery</strong> will be gone after surgery?</td>
</tr>
<tr>
<td>9</td>
<td>87.02</td>
<td>3.4</td>
<td>How important is it for your patient to know how long it will take to experience <strong>complete loss</strong> of all pain?</td>
</tr>
<tr>
<td>10</td>
<td>86.74</td>
<td>3.3</td>
<td>How important is it for your patient to know about any <strong>other pain</strong> he or she may experience after surgery?</td>
</tr>
</tbody>
</table>

Table 26: Ranking of the 10 most important issues therapists regard as important for their lumbar spine surgery patients preoperatively
4.7 Comparison of educational needs indicated by patients and physiotherapists

A main objective of the study was to determine if the educational needs patients identified matched those identified by physiotherapists.

4.7.1 Surgical procedure

Patients and therapists were asked to score, on a scale of 0–100, the importance of questions being asked in relation to the surgical procedure (Table 27).

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question Content</th>
<th>Patient Mean Score</th>
<th>Therapist Mean Score</th>
<th>Difference (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Reason for surgery</td>
<td>94.0426</td>
<td>92.0000</td>
<td>0.23</td>
</tr>
<tr>
<td>1.2</td>
<td>Risk associated with surgery</td>
<td>93.2340</td>
<td>93.7376</td>
<td>0.74</td>
</tr>
<tr>
<td>1.3</td>
<td>Alternatives to surgery</td>
<td>88.6596</td>
<td>93.2482</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>1.4</td>
<td>Description of the procedure</td>
<td>85.7234</td>
<td>75.8227</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Table 27: Differences between patient and therapist mean scores related to surgical procedure

4.7.2 Medical care

Patients and therapists were asked to score, on a scale of 0–100, the importance of questions being asked in relation to the surgical procedure (Table 28).

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question Content</th>
<th>Patient Mean Score</th>
<th>Therapist Mean Score</th>
<th>Difference (p score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Length of anesthesia</td>
<td>64.7447</td>
<td>64.8723</td>
<td>0.97</td>
</tr>
<tr>
<td>2.2</td>
<td>Stop taking medication</td>
<td>77.1277</td>
<td>89.1135</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>2.3</td>
<td>Length of hospital stay</td>
<td>70.5532</td>
<td>73.4752</td>
<td>0.38</td>
</tr>
<tr>
<td>2.4</td>
<td>Need a back brace</td>
<td>65.5106</td>
<td>81.8298</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>2.5</td>
<td>Follow up with the surgeon</td>
<td>74.9149</td>
<td>79.8865</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Table 28: Differences between patient and therapist mean scores related to medical care
4.7.3 Recovery, symptoms and prognosis

Patients and therapists were asked to score, on a scale of 0–100, the importance of questions being asked in relation to the recovery, symptoms and prognosis before lumbar spine surgery (Table 29).

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question Content</th>
<th>Patient Mean Score</th>
<th>Therapist Mean Score</th>
<th>Difference (p-score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Preoperative pain</td>
<td>89.9130</td>
<td>88.3050</td>
<td>0.45</td>
</tr>
<tr>
<td>3.2</td>
<td>Surgery site pain</td>
<td>78.8511</td>
<td>86.5887</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>3.3</td>
<td>Other pain</td>
<td>85.9362</td>
<td>86.7376</td>
<td>0.73</td>
</tr>
<tr>
<td>3.4</td>
<td>Complete loss of symptoms</td>
<td>90.3913</td>
<td>87.0213</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Table 29: Differences between patients and therapists concerning recovery, symptoms and physical therapy

4.7.4 Activities, mobility and physical therapy

Patients and therapists were asked to score, on a scale of 0–100, the importance of questions being asked in relation to the activities, mobility and physical therapy before lumbar spine surgery. In all but one category, there was a statistically significant difference between the answers provided by patients and those provided by therapists (Table 30).

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question Content</th>
<th>Patient Mean Score</th>
<th>Therapist Mean Score</th>
<th>Difference (p-score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Back to work</td>
<td>81.7021</td>
<td>91.4113</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>4.2</td>
<td>Start driving</td>
<td>75.5319</td>
<td>86.1348</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>4.3</td>
<td>Limitations with activities</td>
<td>91.4894</td>
<td>94.1214</td>
<td>0.04</td>
</tr>
<tr>
<td>4.4</td>
<td>Need physical therapy</td>
<td>88.6809</td>
<td>89.4184</td>
<td>0.71</td>
</tr>
<tr>
<td>4.5</td>
<td>Content of physical therapy</td>
<td>76.6383</td>
<td>86.0142</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Table 30: Differences between patients and therapists in regards to activity, mobility and physical therapy
4.8 Education delivery method preferred by patients and therapists

4.8.1 Education delivery method received by patients
Patients who underwent recent lumbar spine surgery were asked to indicate if they had received preoperative education and, if they had, by what means. Of the 47 patients in this study, 39 patients (83%) indicated that they received preoperative education. Patients received preoperative education either through one single intervention or via two or more different types of interventions. Most patients who received preoperative education received it through one-on-one education by the surgeon (n = 17). None of the patients indicated they received education preoperatively through group sessions, video or DVD, Internet, or one-on-one education by a physiotherapist (Figure 13).

Figure 13: Education delivery method received by patients preoperatively

4.8.2 Use of the Internet
Forty-six patients answered this question. Half of the patients (n = 23) who had lumbar spine surgery went on the Internet prior to surgery in search of some additional information. These 23 patients were asked to further indicate if they thought it was beneficial; 91% indicated they thought it was and 9% indicated it was not. There is missing data for one patient.
### 4.8.3 Preferred method of preoperative education delivery by patients

Patients were asked to indicate which means of education delivery they preferred prior to undergoing spinal surgery. The majority of patients chose one-on-one verbal communication (Figure 14).

![Patient education delivery method preference](image)

**Figure 14:** Education delivery method preferences by patients undergoing spinal surgery

### 4.8.4 Physiotherapists providing preoperative education

- Ninety-nine percent of the therapists reported that they believed preoperative education was needed for spinal surgery (n = 141).
- Ninety-two percent of therapists preferred preoperative education to postoperative education (n = 140).
- Ninety-nine percent of therapists thought that preoperative education for spinal surgery patients would result in better outcomes (n = 140).
- Forty-three percent of therapists (n = 61) indicated that they did not provide preoperative education, while 57% (n = 80) provided some form of preoperative education to spinal surgery patients.
- Of the 80 therapists providing preoperative care, only seven indicated that they provided preoperative education in a structured/formal program. The majority of therapists provided preoperative education informally (n = 73).
4.8.5 Surgeons providing preoperative education

Therapists were asked if the surgeons they work with provided preoperative education. The majority of therapists (63%) were not sure if the surgeons provided preoperative education for spinal surgery patients (Figure 15).

![Figure 15: Therapists' knowledge of surgeons' providing preoperative education](image)

4.8.6 Therapists’ preferred method of preoperative education delivery

Therapists were asked to indicate which means of education delivery their patients would prefer prior to undergoing lumbar spine surgery (Table 31).

<table>
<thead>
<tr>
<th>Education delivery method</th>
<th>Percentage of therapists</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-on-one education by health care provider</td>
<td>82%</td>
</tr>
<tr>
<td>Group settings</td>
<td>11%</td>
</tr>
<tr>
<td>Handout</td>
<td>3%</td>
</tr>
<tr>
<td>Website</td>
<td>2%</td>
</tr>
<tr>
<td>Video/DVD</td>
<td>1%</td>
</tr>
<tr>
<td>All</td>
<td>1%</td>
</tr>
</tbody>
</table>

Table 31: Therapists’ indication of their patients’ preferred education delivery method
4.8.7 Preferred professional providing education

One-on-one education was the preferred method of education for both patient and therapist groups, and the most utilized education delivery method by both groups. Further exploration of one-on-one education determined which profession should provide preoperative education for spinal surgery patients. In each of the four sections of the questionnaire, patients and therapists were asked to indicate which profession they thought should provide education related to the section (Table 32). In all categories, patients indicated surgeons as the primary health care provider who should provide preoperative education. Therapists indicated surgeons as the primary education provider related to the surgical procedure and recovery, surgeons’ assistants as best for educating patients on issues related to medical care, and therapists for education regarding activities, mobility and physical therapy (Table 32).

<table>
<thead>
<tr>
<th>Section</th>
<th>Patient Study</th>
<th>Therapist Study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surgeon</td>
<td>Assistant</td>
</tr>
<tr>
<td>1. Surgical Procedure</td>
<td>94%</td>
<td>7%</td>
</tr>
<tr>
<td>2. Medical Care</td>
<td>62%</td>
<td>36%</td>
</tr>
<tr>
<td>3. Recovery &amp; Symptoms</td>
<td>91%</td>
<td>17%</td>
</tr>
<tr>
<td>4. Activity, Mobility &amp; Therapy</td>
<td>66%</td>
<td>23%</td>
</tr>
</tbody>
</table>

Table 32: Preferred profession for education delivery for spinal surgery: Patients and therapists
4.9 Pain, spinal surgery and pain science education

4.9.1 Reason for spinal surgery
Patients were asked to indicate the primary reason for undergoing lumbar spine surgery. Forty-seven patients answered this question. Several patients had more than one major reason for surgery, with combinations of pain and numbness, etc. The vast majority of the patients (74%) indicated pain as the main indication for undergoing lumbar spine surgery (Figure 16).

![Figure 16: Patients' primary reason for undergoing lumbar spine surgery](image)

4.9.2 Patients experiencing pain following surgery
Patients were given a questionnaire at the surgeon’s office within the first month after surgery and were asked to indicate if they were experiencing any pain at the time. Sixty-eight percent (n = 32) indicated they were still experiencing some type of pain, either at the surgery site, original preoperative pain, pain in other areas or leg pain (Figure 17).

Therapists were asked what percentage of their patients still experienced pain. Therapists indicated very similar numbers compared to patients, indicating that 70% of patients still experience pain by the time they attend the surgeon’s office for a follow-up visit approximately one month after surgery (Figure 17).
4.9.3 Pain rating following lumbar spine surgery

The 32 patients who indicated that they still experienced pain following surgery were asked to rate their pain on a scale of 0–100. On average, patients rated their pain as 4.86 on a 0–10 visual analogue scale. Therapists were asked to rate patients’ average pain following spinal surgery, and scored it as 4.79 on a 0–10 visual analogue scale. The average pain rating score between the patient and therapist groups were very similar (p = 0.86).

4.9.3.1 Pain rating and practice setting

Subgroup analysis of therapists in this study reveals that inpatient therapists scored statistically significant (p < 0.01) higher pain ratings compared to outpatient therapists (Figure 18).
4.9.4 Expecting pain after surgery

Patients and therapists were asked if patients expected to have pain following spinal surgery. The majority of patients (85%) indicated that they expected to have pain following surgery (Figure 19). Almost half of the therapists (47%) indicated that their patients did not expect to have any pain following lumbar spine surgery (Figure 19).
4.9.5 Location of pain following lumbar spine surgery

Patients who were still experiencing pain following surgery (n = 32) were asked to indicate where they experienced the pain and their overall impression of whether the pain in that region was similar to, more than, or less than the preoperative symptoms they experienced (Table 33).

<table>
<thead>
<tr>
<th>Back and leg pain clinical presentation</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same leg pain intensity</td>
<td>6%</td>
</tr>
<tr>
<td>Same leg pain – decreased intensity</td>
<td>49%</td>
</tr>
<tr>
<td>Same leg pain – increased intensity</td>
<td>3%</td>
</tr>
<tr>
<td>No leg pain – only back pain</td>
<td>42%</td>
</tr>
</tbody>
</table>

Table 33: Patients’ indication of the location and intensity of their symptoms related to preoperative symptoms

Patients still experiencing pain were also asked to indicate, on a body chart, where they were still experiencing pain (Figure 20). Twenty-nine patients responded to this question. Regions were divided into spine (L1 spinal level to a line above the greater trochanter), below the hips (below the greater trochanter to above the knee), below the knees (knee height to malleoli) and below the ankles (below the malleoli) (see body chart in Appendix 18).

Figure 20: Distribution of pain postoperatively
4.9.6 Reason for persistent pain

Patients who were still experiencing pain (n = 31) were asked to indicate the reason, according to them, for the pain. The majority of patients indicated that they believed that nerves were the main course for their persistent pain (Figure 21).

![Figure 21: Patients' perception of the reason for their persistent pain following surgery](image)

4.9.7 Feelings and thoughts related to persistent pain following spinal surgery

A large proportion of patients (42%) still experiencing pain indicated that they were afraid of the pain following surgery getting worse (Figure 22).

![Figure 22: Patients’ fears of pain getting worse following lumbar spine surgery](image)
Patients and therapists were asked to describe their thoughts and feelings related to persistent pain following spinal surgery. Most patients presented with mainly negative comments reflecting fear and anxiety. Main themes extracted from the patient and therapist questionnaires are shown in Table 34.

<table>
<thead>
<tr>
<th>Positive</th>
<th>Patients</th>
<th>Therapists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Believe pain is normal</td>
<td>Expected pain</td>
<td>Expect some pain</td>
</tr>
<tr>
<td>Believe it will get better</td>
<td>Happy</td>
<td></td>
</tr>
<tr>
<td>Better daily</td>
<td>Thankful</td>
<td></td>
</tr>
<tr>
<td>Expected pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Happy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thankful</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negative</th>
<th>Patients</th>
<th>Therapists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wish it would stop/Ever better?</td>
<td>Disappointed</td>
<td></td>
</tr>
<tr>
<td>Wondering what to do about it</td>
<td>Discouraged</td>
<td></td>
</tr>
<tr>
<td>Disbelief – thought surgery would eliminate pain</td>
<td>Frustrated</td>
<td></td>
</tr>
<tr>
<td>Apprehensive</td>
<td>Concerned</td>
<td></td>
</tr>
<tr>
<td>Frustrated</td>
<td>Worried</td>
<td></td>
</tr>
<tr>
<td>Depressed</td>
<td>Stressed</td>
<td></td>
</tr>
<tr>
<td>Stressed</td>
<td>Anxious</td>
<td></td>
</tr>
<tr>
<td>Naïve</td>
<td>Surprised</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Confused</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Depressed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Despair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anger</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hopelessness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unhappy</td>
<td></td>
</tr>
</tbody>
</table>

Table 34: Patient and therapist expressed thoughts and feelings related to persistent pain following spinal surgery
5. DISCUSSION

The purpose of this study was to contribute towards further understanding of the preoperative educational requirements of patients undergoing lumbar surgery for lumbar radiculopathy. To date, a search of electronic databases has revealed no published research into the patient expectations, content requirements or effect of preoperative educational programs for patients undergoing lumbar surgery (Johannson et al. 2005). This is the first study to report on preoperative educational requirements of patients undergoing spinal surgery for lumbar radiculopathy.

5.1 The importance of preoperative education

One of the key findings of the current study is that all of the patients (100%) surveyed indicated that preoperative education before undergoing spinal surgery for lumbar radiculopathy is important (Section 4.3.1). This concurs with studies in other medical disciplines (cardiology, general surgery and orthopedics) that indicate the importance of preoperative education for patients (Asilioglu and Celik 2004; McDonald et al. 2004; Lin and Wang 2005; Carr et al. 2006). A review of the literature indicates that the majority of studies on preoperative education in medicine are directed towards decreasing fear and anxiety associated with the impending surgery (Asilioglu and Celik 2004; McDonald et al. 2004; Lin and Wang 2005; Carr et al. 2006).

In the current study patients were asked to explain their reasons for rating preoperative education as important, and one of the main themes extracted from the data was to “decrease fear and anxiety” (section 4.3.1). Fear of pain and anxiety associated with pain has been linked to increased levels of disability (Kendall, N., et al. 1997; Waddell 1998). In the current study, 50% of patients expressed fear and anxiety about their persistent pain and were afraid that the pain they were experiencing postoperatively would get worse with time (Section 4.7.8). These issues of fear and anxiety are compounded by the fact that, in general, patients have “false beliefs“ regarding low back pain (LBP) and believe that LBP is disabling, potentially serious and difficult to recover from (Buchbinder et al. 2001; Werner et al. 2005; Gross et al. 2006).
Anxiety and fear is common in preoperative environments (Lin and Wang 2005; Carr et al. 2006; Galaal et al. 2006), and results of this study indicate that patients may rate preoperative education as very important as a means to decrease fear and anxiety associated with the preoperative period. Lower levels of preoperative anxiety have been linked to decrease in postoperative pain, decreased lapse of time before returning to work and reports of improved functional activities (Daltroy et al. 1998; McDonald, S., et al. 2004; Lin and Wang 2005; Carr et al. 2006; Galaal et al. 2006). Based on the results from this study, it can also be argued that patients regard preoperative education as very important and that preoperative educational programs should be developed to meet patient needs. Furthermore, preoperative educational programs should address patient fears and minimize anxiety associated with the surgery.

The results from the physiotherapist study concur with the patient survey, as 99% of the therapists surveyed rated preoperative education as important (Section 4.8.4). Furthermore, 92% of physiotherapists rated preoperative education as more important than postoperative education for patients undergoing lumbar spine surgery (Section 4.8.4). The relative importance allocated by physiotherapists to preoperative education might be explained by their experience in treating postoperative patients. Results of this study demonstrate that outpatient physiotherapist especially rate preoperative education as very important. Studies have shown that the success rate of lumbar disc surgery varies between 60% and 90% (Lurie, et al., 2003; Ostelo, et al., 2004; Deyo and Mizra 2006), showing that 10% – 40% of patients following spinal surgery may have a poor outcome, with resulting pain, loss of movement and relatively poorer function (Ostelo, et al., 2004). This is often referred to as “failed back surgery syndrome” (Hazard 2006 and Rodriguez et al 2006). No published data is available on what percentage of patients is referred to rehabilitation following lumbar spine surgery. There is, however, evidence that patients with persistent disability and pain following spinal surgery are more likely to be sent to physiotherapy for rehabilitation (Delameter et al. 2001; Ostelo et al. 2004 and Hazard 2006). Therefore, physiotherapists treating postoperative patients may be exposed to higher
numbers of patients with poor outcomes following surgery. Additionally, a recent Cochrane review has shown that postoperative rehabilitation has little efficacy in decreasing pain and disability following spinal surgery (Ostelo et al 2004). The potential higher number of patients with persistent pain and disability seen postoperatively in physiotherapy, along with the limited efficacy of postoperative rehabilitation (Ostelo et al 2004 and Donaldson et al 2006) may explain some of the challenges physiotherapists face when working with this population. Additionally, in the current study, 73% of therapists indicated that they did not receive any training in their undergraduate programs in regards to spinal surgery rehabilitation (Section 4.2.7). Difficulties physiotherapist may face in providing postoperative rehabilitation concurs with research showing physiotherapists have significant difficulty with treating persistent pain (Wolff et al. 1991; Foster et al. 1999; Moseley 2003; Latimer et al. 2004). From this, it may be argued that physiotherapists rate preoperative education more important than postoperative education as a means to potentially decrease the magnitude of postoperative disability and pain that can be difficult to manage. Emerging evidence of the efficacy of education in physiotherapy for chronic spinal pain and non-operative LBP populations (Moseley 2003a, Moseley et al 2004, Uderman et al 2004 and Moseley 2005), may support the hypothesis that preoperative education has the potential to decrease pain and disability following spinal surgery.

Preoperative educational programs are important for both patients and physiotherapists (section 4.3.1 and 4.8.4). Preoperative educational programs should be developed to address patient concerns regarding fear and anxiety, which in turn may help decrease pain and disability following spinal surgery.

5.2 Information required in preoperative programs for spinal surgery patients
Patients rated “understanding the reason for surgery” as the most important aspect of preoperative education (Section 4.5). The reason for the surgery may have emerged as most important to patients because patients want to know exactly how their underlying pathological or structural abnormalities will be addressed by the surgical procedure to (Toyonne et al. 2005). In the
current study, more than 70% of the patients underwent surgery for pain, with or without neurological impairment (Section 4.9.1). Thus, it can be argued that patients rated the reason for surgery as important in order to receive an explanation as to how the surgical procedure would alleviate their pain (section 4.4.3). This concurs with a recent study (Toyonne et al. 2005) which showed that patients rate alleviating leg pain very highly as a reason for undergoing surgery.

Results from the current study, discussed in Section 5.2.1, indicate that patients are very interested in how surgery will have an impact on their level of pain experience. Patients also may not have realistic expectations of how surgery may affect their pain level (Toyonne et al 2005). In the study on patients, data was collected in the first 4 weeks postoperatively and 85% of patients reported that they expected to experience pain post operatively (Section 4.9.4). This is in contrast to the study on the physiotherapists where only 47% of the physiotherapists reported that the patients they treat postoperatively expect to have pain following spinal surgery (Section 4.9.4). This discrepancy might be explained by changing expectations as patients are farther removed from the surgical procedure. In this study patients were surveyed within the first 3 – 4 weeks postoperatively when they clearly still expected to experience some pain. Patients are typically not referred to physiotherapy until after this 3 – 4 week period (Delameter et al 2001). Consequently, physiotherapist reports that less than half of their postoperative patients expected to experience pain may reflect that these patients often do not expect pain to persist beyond the first 3 – 4 week postoperative period. Preoperative education programs should address the reason for the surgery as well as how the patient’s primary complaint may be experienced in the postoperative period (Section 4.5). Preoperative education about how surgery will impact symptoms may be particularly important for those patients who experience pain preoperatively, compared to patients with only neurological deficits (i.e., numbness and weakness). Patients need to develop realistic goals associated with the ability of surgery to alleviate their pain (Toyone et al 2005). What constitutes realistic expectations remains unclear as no studies have been found to track the natural history of leg pain following lumbar spine
surgery. A study by McGregor and Hughes (2002) has shown that patients with spinal stenosis have “unrealistic goals” compared to patients undergoing lumbar spine surgery for disc injury. Preoperative educational programs should therefore address potential timelines for realistic expectations of pain and pain relief after surgery.

The reason for surgery (section 4.5) and surgical procedure (section 4.5) may also correlate with an understanding of the risks of surgery. Risks were the second-highest-rated educational concern amongst patients (Section 4.5). This finding related to risk factors may signify that an understanding of the risk of medical interventions, such as lumbar surgery, may be equally or more important than knowledge of the potential effectiveness of the proposed intervention (WHO-ICF 2001). Serious risks associated with general surgery may include death, blood clots, spinal cord injury and infection (Mazur and Mazur 1997; Aunen 2003). Generally, risks and harmful effects of medical interventions such as surgery are poorly documented (Clarke 2006). Information about risk factors is in accordance with the current trends towards safe and effective intervention encapsulated in the principles of evidence-based practice (Sackett 1998; Waddell 1998). Non life-threatening risks associated with spinal surgery generally include permanent and long-term functional and occupational disability and deterioration of the symptoms after surgery into a chronic pain conditions. Disability is defined as “the outcome or result of a complex relationship between and individual’s health condition, personal factors and social factors” by the world health organization (WHO) (WHO – ICF 2001). The impact of persistent pain and disability following spinal surgery will not only impact patient’s physical well-being, but impact their ability to function within their work and social environment and often lead to “disastrous emotional and financial consequences to the patient” (Onesti 2004). The area of risk associated with lumbar surgery should be better explored in future research studies.

Limitations were rated by patients as the third most important educational requirement to be addressed (Section 4.5) and were rated as most important by physiotherapists (Section 4.6). Similar findings were reported by patients
undergoing other orthopedic surgeries (Hoermann et al. 2001; Kennelly and Bowling 2001; Buchbinder et al. 2001; Macario et al. 2003; Werner et al. 2005; Gross et al. 2006). Documented limitations following spinal surgery include loss of range of motion, altered movement patterns and weakness (Dolan et al. 2000, Onesti 2004, Hazard 2005, Donaldson et al. 2006). The need for patients to know about limitations is highlighted by the International Classification of Functioning, Disability and Health by the World Health Organization (WHO-ICF 2001). Surgery, like any other disease or injury, may impact one’s ability to take care not only of oneself, but also of one’s family (WHO-ICF 2001). This is a very important part of a patient’s decision-making process regarding surgery (Buchbinder et al. 2001; Werner et al. 2005; Toyonne et al. 2005; Gross et al. 2006). Limitations apply not only to work-related activities but also to a person's creative outlets, including sport, hobbies and recreation (Buchbinder et al. 2001; Werner et al. 2005; Toyonne et al. 2005; Gross et al. 2006). These social factors form part of a bio-psycho-social approach which has been shown to be more effective in dealing with patients with persistent pain and disability (Kendall et al. 1998, Waddell et al. 1998 and Butler 2001). Preoperative educational programs should therefore address how surgery may negatively impact a patient’s physical mobility, social interaction and being able to take care of themselves and their family (Gross et al. 2006). By addressing limitations related to mobility as well as social impact, preoperative educational programs may help patients set realistic goals and expectations for recovery and return to function. This may consequently provide patients with an increased understanding of how surgery for lumbar radiculopathy will impact their life.

Physiotherapists rated limitations of surgery as the most important aspect to include in an educational preoperative program for spinal surgery patients (section 4.6). Physiotherapists may be the ideal group of professionals to address issues related to mobility, function and limitations after spinal surgery (Section 4.6.8). Physiotherapists, by definition of its scope of practice (American Physical Therapy Association), aim to restore disability and function, and would therefore be familiar with issues related to function, limited function and disability. This argument is strengthened by the results
from this study showing that therapists scored higher than patients in all five categories related to activity, movement and physical therapy (Section 4.4.4), which highlights therapists’ knowledge of their scope of practice. Postoperative physiotherapy treatment may offer patients exercise for ROM (Dolan et al 2000, Ostelo et al 2003), strengthening (Dolan et al 2000, Ostelo et al 2003a and 2003b and Donaldson et al 2006) and education (Christensen et al 2003, and Ostelo et al 2003a), which have all shown to help decrease pain and disability in postoperative patients. The results of this study show that patients scored lower on all five questions related to movement in comparison to the physiotherapists which could also indicate that patients have a poor understanding of the role of physiotherapy in surgery populations. This concurs with previous studies that show patients have a poor understanding of the scope of physiotherapy and what therapy may offer patients with low back pain (Snow et al 2001). Physiotherapy should therefore aim to educate patients more in regards to the scope of physiotherapy, especially in relation to spinal surgery where physiotherapy interventions have been shown to decrease pain and disability.

In the current study, physiotherapists rated the availability of alternatives to surgery as more important than patients (p < 0.001) (section 4.7.1). As discussed in the paragraphs above, patients with persistent disability and pain following spinal surgery is often referred to physiotherapy for rehabilitation to increase function and decrease disability and pain (Delameter et al 2001 and Ostelo et al 2004). From this, it could be argued that physiotherapists do not have very positive and favorable views of the efficacy of spinal surgery. This argument is strengthened by the results from this study, which demonstrated a statistical difference (p < 0.01) between inpatient and outpatient physiotherapists with regards to alternatives to surgery. Patients undergoing lumbar spine surgery are usually hospitalized for 1–2 days (Delameter et al. 2001), and physiotherapists working in the acute-care/inpatient environments may expect pain and disability immediately following surgery related to the incision and normal predictive stages of tissue healing (Butler and Moseley 2003). Physiotherapists practicing in outpatient environments see patients usually 4–6 weeks after surgery (Dolan 2000; Delameter et al. 2001; Ostelo et
al. 2004) and when patients still experience significant pain at 4–6 weeks and beyond, outpatient therapists may develop a more negative view of spinal surgery compared to inpatient therapists. As time passes it is expected that pain diminish (Butler and Moseley 2003) and when patients present at outpatient physiotherapy for rehabilitation with high levels of pain, therapists may value alternatives to surgery as much more important, as evidenced by the results from this study (section 4.7.1). Physiotherapists treating LBP in outpatient orthopedic environments are also exposed to nonsurgical interventions that have shown efficacy in treating lumbar radiculopathy and may impact their rating of alternatives as important. Interventions such as lumbar spine epidurals (Riew et al 2000, Narozny et al 2001 and Riew et al 2006), spinal manipulation (Flynn et al 2002) and exercise (O'Sullivan 1997, Hodges 1999, Hides et al 2001) have shown efficacy in reducing LBP with/without lumbar radiculopathy. Physiotherapists may thus view alternative management of lumbar radiculopathy as very important.

5.2.1 Pain education in preoperative educational programs

The study findings indicate pain and their desire to know more about pain as one of the main reasons for undergoing lumbar spine surgery. (Section 4.5). Seventy-six percent of the patients in this study indicated pain as one of the main reasons for undergoing lumbar spine surgery (Section 4.9.1). This is significantly higher than any of the other indications for surgery, numbness, decreased mobility or failed conservative treatment. Pain is a powerful motivating force that guides medical care and seeking behaviours in patients (Mortimer et al. 2003; Bernard and Wright 2004; Verbeek et al. 2004). In the current study, 97% of the patients indicated that the preoperative education they received was beneficial (Section 4.3.2). In comparison, only 63% percent of patients felt they received inadequate information about pain (Section 4.3.2). Patients are interested in pain, especially in whether there will be complete loss of symptoms (ranked fourth) (Section 4.5) as well as the degree of preoperative pain (ranked fifth) (Section 4.5). This concurs with results from the physiotherapist study, showing that therapists are also interested in pain. In the current study therapists also rated preoperative pain, postoperative pain and complete resolution of pain as very important (Section 4.6).
Pain is a complex phenomenon that involves neural processing of pain throughout the entire brain and nervous system (Butler and Moseley 2003). Radiculopathy has been shown to be one of the most important physical factors in the development of a chronic pain state (Kendall, N., et al 1997). Research into the inflammatory properties of the intervertebral disc has shown that lumbar radiculopathy may be associated with the release of proinflammatory chemicals, especially phospholipase A2 (PLA2). This causes a chemical activation of the nerve root (Piperno et al. 1997; Ozaktay et al. 1998; Burke et al. 2003; Ng et al. 2005). Additionally, these proinflammatory chemicals have been shown to cause dysmyelination/demyelination of the proximal nerve root, thus exposing the bare nerve to additional irritation (Burke et al 2003). This in turn may lead to increased sensitivity (hyperalgesia) of the nerve root (Bogduk and Twomey 1997; Butler 2000; Butler and Moseley 2003; Greening et al. 2004). Persistent pain may lead to central sensitization, in which the pain is the result of abnormal processing within the cerebral hemispheres, brainstem and/or spinal cord, with or without input from the peripheral nervous system (Butler 1991; Gifford 1998; Butler 2000). Patients with radiculopathy may have to deal with consequences related to persistent pain, as shown by the results of this current study.

 Patients should be educated more about pain and, more precisely, about pain science (Moseley 2003). Studies have shown that patients are capable of understanding the neurophysiology of pain, although professionals usually underestimate patients’ ability to understand the “complex” issues related to pain (Moseley 2003). Research into education of patients on the science of pain have shown significant changes in regards to pain beliefs and attitudes, improved cognition and physical performance, increased pain thresholds and improved outcomes from therapeutic exercise (Moseley 2002; Moseley 2003b; Moseley et al. 2004; Moseley 2004). Improved understanding of pain science or neurophysiology may also lead to a decrease in the fear and anxiety associated with spinal surgery, and could potentially result in better outcomes related to decreased pain and improved function. (Moseley et al 2004).
Fear of pain has been shown to be one of the most powerful contributors to the development of chronic ongoing pain states (Kendall et al. 1997; Waddell 1998). Fear and anxiety are important psychosocial factors (“yellow flags”) that are predictors of chronic pain (Kendall et al. 1997). In the current study, 50% of patients expressed fear and anxiety about their persistent pain and were afraid that the pain they were experiencing postoperatively would get worse with time (Section 4.9.7). Fear and anxiety may lead to additional catastrophisation (Kendall et al. 1997; Butler 2000; Butler and Moseley 2003; Waddell and Burton 2005). Lower income and lower educational status are associated with increased fear-avoidance beliefs associated with LBP (Poiraudeau et al. 2006). In the current study, patients with lower income were also more interested in when they would see the surgeon for a follow-up visit (Section 4.4.2.1), which may be reflective of patients with lower socioeconomic circumstances having more issues related to the development of pain and dependency on medical care (Waddell and Burton 2005). The yellow flags are also important in the duration and disability of acute pain conditions and are not just confined to chronic pain conditions (Ciccone and Just 2001; Grotle et al. 2004). A preoperative program for spinal surgery should include issues related to “yellow flags” (return to work, fear of injury, fear of returning to work and dependency on medical personnel), since educational programs addressing these issues lead to increased levels of activity and participation in social activities (Moseley et al. 2004; Swinkels-Meewisse et al. 2006). Pain education should include biopsychosocial educational interventions as patients desire to know more about the risks and limitations associated with spinal surgery (Section 4.5).

In this study physiotherapists also rated information on pain as being important for patients to know (section 4.6) Physiotherapists’ interest in pain may be related to their own difficulty with treating pain, especially chronic pain (Wolff et al. 1991; Foster et al. 1999; Moseley 2003; Latimer et al. 2004). In three of the four categories related to pain (preoperative pain, pain at the surgery site and other pain), therapists with less experience rated a statistically significantly higher importance (p < 0.001) to pain issues
compared to therapists with more experience (Section 4.3.4). Studies have shown that 96% of therapists in orthopedics “do not want to work with” chronic pain patients (Wolff et al. 1991). Therapists’ difficulty in dealing with pain may be reflective of two problems. The first may be inadequacies in the treatment models physiotherapists use in treating and managing pain. Therapists still tend to focus more on the biomedical models of spinal pain, (anatomy, physiology and biomechanics) and do not include psychological and social issues (Gifford 1998; Foster et al. 1999). New biopsychosocial and behavioural-graded models are emerging where biopsychosocial factors, such as fear avoidance, and pain science are merged with traditional therapy approaches (Harding and Williams 1995; Gifford 1998; Main and Watson 1999; Moseley 2003; George et al. 2003). Therapists should therefore critically appraise their treatment model to reflect the modern best practice of an integrated approach involving pain science, physiotherapy and psychological and social issues (Waddell 1998; Gifford 1998; Butler 2000). This may be beneficial to patients, as therapists’ beliefs regarding pain shape their attitudes towards and treatment of patients with pain (Stenmar and Nordholm 1994; Askew et al. 1998; Daykin and Richardson 2004). The second factor related to therapists’ views of pain may be education. Wolff et al. (1991) showed that 72% of therapists believe they received inadequate training in their undergraduate programs regarding pain, especially chronic pain. In the current study, 73% of therapists indicated that they did not receive any training in their undergraduate programs on spinal surgery rehabilitation (Section 4.2.7). It has been shown that after an educational session on pain science, physiotherapy students are more knowledgeable about and comfortable with treating chronic pain (Ostelo et al. 2003; Latimer et al. 2004). Physiotherapy education programs should therefore ensure that students are taught about spinal surgery and pain science, as therapists who face new and unfamiliar challenges often experience anxiety (Schumacher et al. 1997).
5.3 Educational delivery method

Both patient and therapist groups view preoperative education as important. Individual educational-delivery method was chosen by both the patient group and the physiotherapist group as the preferred educational delivery method for lumbar spine surgery patients (Section 4.8.3). One-on-one education has been shown to be the preferred method of education delivery in other surgical populations (Hoermann et al. 2001; Macario et al. 2003). One-on-one education provides patients with a more interactive format and provides an opportunity for seeking answers to questions (Ogden et al. 2004). This is in contrast to more passive educational delivery methods, such as informational booklets and the internet. Studies have shown that booklets have modest results at best (Barrett et al. 2002) and may be only a means of covering medico-legal aspects related to preparation of patients for surgery (Turner and Williams 2002). In the current study, 50% of the patients searched the internet prior to surgery (Section 4.8.2) with 92% of these patients reporting that the internet was helpful. In contrast, when patients had to make a decision on their preferred method of education delivery, only 4% of patients chose the internet or a website (Section 4.8.3). This strengthens the argument that patients prefer one-on-one verbal communication when seeking further education regarding their condition. This concurs with studies showing limited utilization of the internet by patients seeking medical help regarding their health care (Yom and Yee 2006).

5.4 Summary

Patients and physiotherapists rate preoperative education as important and there is a need for the development of preoperative educational programs. Preoperative educational programs should include education on reasons for surgery, risks associated with surgery, limitations following surgery and alternatives to the surgical procedure. Additionally, both patient and physiotherapist groups rated education regarding pain, especially pain outcomes following surgery, as very important. Verbal individual education was the preferred method of delivery of preoperative education for spinal surgery patients.
6. CONCLUSIONS, LIMITATIONS and RECOMMENDATIONS

This is the first study on preoperative education for patients with lumbar radiculopathy undergoing spinal surgery.

Both patients and physiotherapists rate preoperative education as a very important part of the surgical intervention for patients undergoing surgery for lumbar radiculopathy. Based on the results of this study, preoperative education programs should be developed and validated through research for clinical implementation.

Preoperative educational programs should address the exact reason or indication for surgery, risks associated with surgery, alternatives to surgery and limitations following surgery in relation to functional activities. Additionally, both patient and physiotherapist groups identified a need for patients to receive more education about pain, especially in regards to outcomes, goals and timelines following lumbar spine surgery.

A preoperative education programs for spinal surgery is best achieved through one-on-one verbal communication between a patient and a healthcare provider who specializes in spinal surgery. Surgeons should provide education to patients related to the surgical procedure, the prognosis and expectations regarding pain. Based on the results of this study and its scope of practice, physiotherapists may be the ideal professionals to provide preoperative education regarding function and pain. With surgeons having limited time availability and physiotherapists having increased education in and clinical application of pain science, physiotherapy may be ideally suited for preoperative patient education. Additionally, patients should be educated about the scope of physiotherapy in spinal surgery patient populations, as it relates to both the preoperative and postoperative periods.
6.1 Limitations

The following limitations apply to the study:

• The sample size of patients in the current study is small (n = 47) and therefore limits being able to generalize the study findings to larger populations.

• The current study was conducted on patients in the greater Kansas City metropolitan area, and care should be taken to extrapolate the results to all spinal surgery patients in the United States and worldwide. This study highlighted several psychosocial issues related to spinal surgery and these factors most likely vary among different geographical, geopolitical and social regions.

• The results of the current study pertain to lumbar laminectomy, discectomy, microdiscectomy and laminotomy for lumbar radiculopathy. These results may not necessarily be applicable to other types of lumbar surgery (fusion, nucleoplasty, disc arthroplasty, etc.), cervical spine surgery, thoracic spine surgery or surgeries for conditions other than lumbar radiculopathy, such as spinal stenosis, spondylolisthesis, fractures, etc.

• The results from the current study are applicable to patients between the ages of 20 and 65. Results may not be applicable to patients older than 65 or younger than 18, as these patients may have different educational needs.

6.2 Recommendations

There are no studies on preoperative education for spinal surgery patients (Johannson K, et al., 2005). The results of the current study highlight patients’ and therapists’ need to develop a preoperative program for spinal surgery patients as well as issues associated with spinal surgery. Further
recommendations for future studies on preoperative education for spinal surgery patients include:

- Similar studies on other areas of spine surgery, such as cervical or thoracic.

- Similar studies on other lumbar spine surgery populations, such as spinal fusion or arthroplasty patients.

- Similar studies on patients undergoing lumbar surgery for other pathologies, such as spinal stenosis.

- Studies investigating the educational needs of older patients (age 65 and above).

- The development of a preoperative educational package incorporating results from the current study to determine if such a program results in better outcomes related to pain and disability following surgery compared to outcomes in patients not receiving such a program.

- The development of a pain science-based preoperative education program for spinal surgery patients to compare its efficacy with traditional biomedical education packages.

- Further study into the attitudes and beliefs of physiotherapists in regards to spinal surgery and spinal surgery rehabilitation.

- A study comparing preoperative education delivery by profession, i.e., surgeons, surgeon assistants and physiotherapists.

- Further studies into the optimal timing, frequency and length of preoperative education programs for spinal surgery patients.
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Appendix 1: The specific search strategy for each database

**Biomed Central:**
Advanced search
1. Title to include: Laminectomy
2. Title to include: Laminectomy AND Rehabilitation
3. Title to include: Laminectomy AND Exercise
4. Title to include: Laminectomy AND Education
5. Title to include: Laminectomy AND Instruction
6. Title to include: Laminectomy AND Advice
7. Title to include: Laminectomy AND Cognitive
8. Title to include: Discectomy
9. Title to include: Fusion
10. Title to include: Physical AND Therapy

**BMJ.com**
Advanced Search:
1. Spine, Surgery, Rehabilitation
2. Spine, Surgery, Exercise
3. Spine, Surgery, Education
4. Spine, Surgery, Therapy
5. Spine, Surgery
6. Laminectomy
7. Discectomy
8. Spinal, Fusion
9. Spinal, Fusion, Rehabilitation
10. Spinal, Fusion, Exercise
11. Spinal, Fusion, Education
12. Spinal, Fusion, Therapy
13. Exercise, Spine
14. Education, Spine
15. Patient, Education
16. Patient, Instruction
17. Back, Surgery
18. Cognitive, Education
**CINAHL**
1. Laminectomy AND Rehabilitation
2. Laminectomy AND Exercise
3. Laminectomy AND Education
4. Laminectomy AND Patient Education
5. Laminectomy AND Physical AND Therapy
6. Discectomy AND Rehabilitation
7. Discectomy AND Education
8. Discectomy AND Exercise
9. Discectomy AND Therapeutic Exercise
10. Discectomy AND Physical AND Therapy
11. Spinal AND Fusion AND Rehabilitation
12. Spinal AND Fusion AND Education
13. Spinal AND Fusion AND Patient Education
15. Disk AND Arthroplasty AND Rehabilitation

**Cochrane Library**
Advanced Search
1. Laminectomy AND Rehabilitation
2. Laminectomy AND Exercise
3. Laminectomy AND Education
4. Laminectomy AND Therapy
5. Discectomy AND Rehabilitation
6. Discectomy AND Exercise
7. Discectomy AND Education
8. Discectomy AND Therapy
9. Spinal AND Fusion AND Rehabilitation
10. Spinal AND Fusion AND Exercise
11. Spinal AND Fusion AND Education
12. Spinal AND Fusion AND Therapy
13. Patient AND Education AND Spine
14. Video AND Spine
15. DVD AND Spine
16. Videodisk AND Spine
17. Pamphlet AND Spine
18. Booklet AND Spine
19. Instruction AND Spine
20. Internet AND Spine
21. Vertebroplasty AND Rehabilitation
22. Vertebroplasty AND Exercise
23. Vertebroplasty AND Education
24. Vertebroplasty AND Therapy
25. Group AND Education AND Spine
26. Disk AND Replacement AND Rehabilitation
27. Disk AND Replacement AND Exercise
28. Disk AND Replacement AND Education
29. Disk AND Replacement AND Therapy
30. Postoperative AND Spine AND Rehabilitation
31. Postoperative AND Spine AND Exercise
32. Postoperative AND Spine AND Education
33. Postoperative AND Spine AND Therapy
34. Preoperative AND Spine AND Rehabilitation
35. Preoperative AND Spine AND Exercise
36. Preoperative AND Spine AND Education
37. Preoperative AND Spine AND Therapy

**Digital Dissertations**

1. Spine AND Surgery
2. Lumbar AND Spine AND Surgery
3. Education AND Spine AND Surgery
4. Exercise AND Spine AND Surgery
5. Rehabilitation AND Spine AND Surgery
6. Physical Therapy AND Spine AND Surgery
7. Physiotherapy AND Spine AND Surgery
8. Laminectomy
9. Spinal AND Fusion
10. Lumbar AND Disk AND Replacement
11. Lumbar AND Disk AND Arthroplasty
12. Lumbar AND Arthroplasty
13. Spine AND Postoperative
14. Spine AND Preoperative
15. Video AND Spine
16. DVD AND Spine
17. Internet AND Spine
18. Booklet AND Spine
19. Pamphlet AND Spine
20. Rehabilitation AND Spine
21. Exercise AND Spine
22. Education AND Spine

**Google:**
1. Find results with the EXACT phrase: postoperative spine surgery education
2. Find results with the EXACT phrase: preoperative spine surgery education
3. Find results with the EXACT phrase: spinal surgery education

**NLM Central Gateway:**
1. Laminectomy AND Rehabilitation
2. Laminectomy AND Exercise
3. Laminectomy AND Education
4. Laminectomy AND Therapy
5. Laminectomy AND Cognitive
6. Laminectomy AND Instruction
7. Laminectomy AND Videodisk
8. Laminectomy AND Advice
9. Discectomy AND Rehabilitation
10. Discectomy AND Exercise
11. Discectomy AND Education
12. Discectomy AND Therapy
13. Discectomy AND Cognitive
14. Discectomy AND Instruction
15. Discectomy AND Videodisk
16. Discectomy AND Advice
17. Spinal AND Fusion AND Rehabilitation
18. Spinal AND Fusion AND Exercise
19. Spinal AND Fusion AND Education
20. Spinal AND Fusion AND Therapy
21. Spinal AND Fusion AND Cognitive
22. Spinal AND Fusion AND Instruction
23. Spinal AND Fusion AND Videodisk
24. Spinal AND Fusion AND Advice
25. Disc AND Replacement AND Rehabilitation
26. Disc AND Replacement AND Exercise
27. Disc AND Replacement AND Education
28. Disc AND Replacement AND Therapy
29. Disc AND Replacement AND Instruction
30. Disk AND Arthoplasty
31. Education AND Spine AND Surgery
32. Advice AND Spine AND Surgery
33. Instruction AND Spine AND Surgery

PubMed/Medline:
MeSH Headings:
1. Spine AND Exercise
2. Exercise AND Spine Surgery
3. Patient Education AND Spine
4. Patient Education AND Exercise
5. Laminectomy AND Patient Education
6. Laminectomy AND Exercise
7. Laminectomy AND Rehabilitation
8. Laminectomy AND Physical Therapy
9. Laminectomy AND Postoperative Care
10. Discectomy AND Patient Education
11. Discectomy AND Exercise
12. Discectomy AND Rehabilitation
13. Discectomy AND Physical Therapy
14. Discectomy AND Postoperative Care
15. Spinal Fusion AND Exercise
16. Spinal Fusion AND Patient Education
17. Spinal Fusion AND Rehabilitation
18. Spinal Fusion AND Physical Therapy
19. Spinal Fusion AND Postoperative Care
20. Disc Replacement
21. Joint Replacement
22. Vertebroplasty
23. Arthroplasty
24. Lumbar Vertebrae Surgery AND Exercise
25. Lumbar Vertebrae Surgery AND Patient Education
26. Lumbar Vertebrae Surgery AND Rehabilitation
27. Lumbar Vertebrae Surgery AND Physical Therapy
28. Lumbar Vertebrae Surgery AND Postoperative Care
29. Video Recording AND Spine
30. CD AND Spine
31. Group Education
32. Education AND Spine Surgery
33. Back Surgery AND Patient Education
34. Group Process AND Spine Surgery
35. Preoperative Care AND Spine Surgery

**PEDro:**
1. Abstract Title: Surgery
2. Therapy: Education
   Problem: Pain
   Body Part: Lumbar Spine, Sacroiliac Joint or Pelvis
   Sub discipline: Orthopaedics
   Method: Clinical Trial
   Match all search items “AND”
Abstract Title: Surgery

3. Therapy: Fitness Training
   Problem: Pain
   Body Part: Lumbar Spine, Sacroiliac Joint or Pelvis
   Sub discipline: Orthopaedics
   Method: Clinical Trial
   Match all search items “AND”

Abstract Title: Surgery

4. Therapy: Health Promotion
   Problem: Pain
   Body Part: Lumbar Spine, Sacroiliac Joint or Pelvis
   Sub discipline: Orthopaedics
   Method: Clinical Trial
   Match all search items “AND”

Abstract Title: Surgery

5. Therapy: Hydrotherapy and Balneotherapy
   Problem: Pain
   Body Part: Lumbar Spine, Sacroiliac Joint or Pelvis
   Sub discipline: Orthopaedics
   Method: Clinical Trial
   Match all search items “AND”

Abstract Title: Surgery

6. Therapy: Strength Training
   Problem: Pain
   Body Part: Lumbar Spine, Sacroiliac Joint or Pelvis
   Sub discipline: Orthopaedics
   Method: Clinical Trial
   Match all search items “AND”
Abstract Title: Surgery

7. Therapy: Mobilization

Problem: Pain

Body Part: Lumbar Spine, Sacroiliac Joint or Pelvis

Sub discipline: Orthopaedics

Method: Clinical Trial

Match all search items “AND”

**PsycInfo:**
1. Laminectomy
2. Discectomy
3. Spinal Fusion
4. Spine Surgery
5. Back Surgery
6. Education AND Spine
7. Spine AND Surgery AND Rehabilitation
8. Spine AND Surgery
9. Patient AND Education AND Spine
10. Spine AND Education
11. Spine AND Exercise
12. Spine AND Rehabilitation
13. Spine AND Therapy

**ScienceDirect:**
1. Laminectomy AND Rehabilitation
2. Laminectomy AND Exercise
3. Laminectomy AND Education
4. Laminectomy AND Instruction
5. Laminectomy AND Advice
6. Laminectomy AND Cognitive
7. Laminectomy AND Therapy
8. Discectomy AND Rehabilitation
9. Discectomy AND Exercise
10. Discectomy AND Education
11. Discectomy AND Instruction
12. Discectomy AND Advice
13. Discectomy AND Cognitive
14. Discectomy AND Therapy
15. Fusion AND Rehabilitation
16. Fusion AND Exercise
17. Fusion AND Education
18. Fusion AND Instruction
19. Fusion AND Advice
20. Fusion AND Cognitive
21. Fusion AND Therapy

**Web of Science:**
1. SPINE (#1)
2. SURGERY (#2)
3. # 1 (SPINE) and #2 (SURGERY) = (#3)
4. LUMBAR (#4)
5. #3 (SPINE AND SURGERY) AND #4 (LUMBAR) = (#5)
6. EXERCISE (#6)
7. #5 (SPINE/SURGERY/LUMBAR) and #6 (EXERCISE) = (#7)
8. EDUCATION (#8)
9. #5 (SPINE/SURGERY/LUMBAR) and #8 (EDUCATION) = (#9)
10. REHABILITATION (#10)
11. #5 (SPINE/SURGERY/LUMBAR) and #10 (REHABILITATION) = (#11)
12. THERAPY (#12)
13. #5 (SPINE/SURGERY/LUMBAR) and #12 (THERAPY) = (#13)
14. LAMINECTOMY (#14)
15. #6 (EXERCISE) and #14 (LAMINECTOMY) = (#15)
16. #8 (EDUCATION) and #14 (LAMINECTOMY) = (#16)
17. DISKECTOMY (#17)
18. #6 (EXERCISE) and #17 (DISKECTOMY) = (#18)
19. #8 (EDUCATION) and #17 (DISKECTOMY) = (#19)
20. #10 (REHABILITATION) and #17 (DISKECTOMY) = (#20)
21. #12 (THERAPY) and #17 (DISKECTOMY) = (#21)
22. SPINAL (#22)
23. FUSION (#23)
24. #22 (SPINAL) and #23 (FUSION) = (#24)
25. #6 (EXERCISE) and #24 (SPINAL and FUSION) = (#25)
26. #8 (EDUCATION) and #24 (SPINAL and FUSION) = (#26)
27. #10 (REHABILITATION) and #24 (SPINAL and FUSION) = (#27)

**Australian Journal of Physiotherapy:**
1. Laminectomy
2. Discectomy
3. Fusion

**European Spine Journal:**
1. Education
2. Advice
3. Instruction
4. Cognitive
5. Exercise

**Physical Therapy:**
1. Laminectomy
2. Discectomy
3. Spinal Fusion

**Spine:**
1. Patient AND Education
2. Surgery AND Education
3. Surgery AND Exercise
4. Surgery AND Rehabilitation
5. Surgery AND Instruction
6. Preoperative
7. Postoperative
The Spine Journal:
1. Education
2. Instruction
3. Advice
4. Cognitive
5. Exercise
6. Rehabilitation

Pain:
1. Spine AND Surgery AND Rehabilitation
2. Spine AND Surgery AND Exercise
3. Spine AND Surgery AND Education
4. Cognitive AND Spine
5. Education AND Spine
### Appendix 2 Full text randomized controlled trials for the systematic review

<table>
<thead>
<tr>
<th>Authors</th>
<th>Journal</th>
<th>Year</th>
<th>Country</th>
<th>Study Design</th>
<th>Sample Age</th>
<th>Gender</th>
<th>Surgery Type</th>
<th>Interventions &amp; group sizes</th>
<th>Education method</th>
<th>Outcomes &amp; Scales</th>
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<tbody>
<tr>
<td>Ostelo et al</td>
<td>Spine</td>
<td>2003</td>
<td>Netherlands</td>
<td>RCT</td>
<td>18-65</td>
<td>Male &amp; Female</td>
<td>Discectomy</td>
<td>Behavioral Graded Activity (BGA) group (n = 52)</td>
<td>One-on-one PT</td>
<td>Pain – Visual Analog Scale</td>
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<td>2003a</td>
<td>European Spine Journal</td>
<td>2003</td>
<td>Netherlands</td>
<td>RCT</td>
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<td>Male &amp; Female</td>
<td>Discectomy</td>
<td>Behavioral Graded Activity (BGA) group (n = 52)</td>
<td>One-on-one PT</td>
<td>Pain – Visual Analog Scale</td>
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<td>Filiz et al</td>
<td>Clinical Rehabilitation</td>
<td>2005</td>
<td>Turkey</td>
<td>RCT</td>
<td>20-50</td>
<td>Male &amp; Female</td>
<td>Discectomy</td>
<td>Intensive exercises and back school education (n = 20)</td>
<td>One-on-one Physician</td>
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<tr>
<td>2005</td>
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<td>United Kingdom</td>
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<td>18-60</td>
<td>Male &amp; Female</td>
<td>Microdiscectomy</td>
<td>Advice and education on exercises and ADL’s (n = 10)</td>
<td>Video of exercises, one time instruction by PT (n = 30)</td>
<td>Disability – Low Back Rating Scale</td>
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<td>Dolan et al</td>
<td>Spine</td>
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<td>Denmark</td>
<td>RCT</td>
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<td>Male &amp; Female</td>
<td>Spinal Fusion</td>
<td>Video of exercises, one time instruction by PT (n = 4)</td>
<td>Exercise program for 8 weeks (n = 30)</td>
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<td>Advice on resuming ADL's as soon as pain allows (n = 47)</td>
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<td>Christensen et al</td>
<td>The Spine Journal</td>
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<td>RCT</td>
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<td>Six month gym-based exercise program (n = 46)</td>
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<td>RCT</td>
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<td>Control group: Advice on resuming ADL’s as soon as pain allows (n = 47)</td>
<td>One-on-one PT</td>
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**Outcomes & Scales**
- Pain – Visual Analog Scale
- Disability – Low Back Rating Scale
- Disability - Oswestry
## Preoperative Education for Lumbar Spine Surgery Patients

<table>
<thead>
<tr>
<th>Authors</th>
<th>Disability – Roland Morris</th>
<th>Disability – Roland Morris</th>
<th>Disability – Low Back Rating Scale</th>
<th>Disability – Low Back Outcome Scale</th>
<th>Time off work – Patient Log</th>
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<tr>
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<th>Disability – Global Perceived Effort</th>
<th>Disability – Modified Oswestry</th>
<th>Back Muscle Endurance – Electromyography</th>
<th>Time off work – Patient Log</th>
<th>Disability – Roland Morris</th>
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<tr>
<td><strong>Catastrophisation – Pain Catastrophisation scale</strong></td>
<td><strong>Catastrophisation – Pain Catastrophisation scale</strong></td>
<td><strong>Back Muscle Strength – Progressive Isoinertial Lifting Eval.</strong></td>
<td><strong>Back Muscle Endurance – Biering-Sorensen Test</strong></td>
<td><strong>Time off work – Patient Log</strong></td>
<td><strong>General Health – Short form 36 – Health Questionnaire</strong></td>
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<td><strong>Range of Motion – Cybex</strong></td>
<td><strong>Range of Motion – Cybex</strong></td>
<td><strong>Depression – Back Depression Inventory</strong></td>
<td><strong>Depression – Zung Depression Scale</strong></td>
<td><strong>Posture – 3-Space Isotrack</strong></td>
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<tr>
<td><strong>Fear of Movement – Tampa Scale</strong></td>
<td><strong>Fear of Movement – Tampa Scale</strong></td>
<td><strong>General Health – Multidimensional Health Questionnaire</strong></td>
<td><strong>General Health – Multidimensional Health Questionnaire</strong></td>
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<td><strong>Drop out rate</strong></td>
<td><strong>Drop out rate</strong></td>
<td><strong>Drop out rate</strong></td>
<td><strong>Drop out rate</strong></td>
<td><strong>Drop out rate</strong></td>
<td><strong>Drop out rate</strong></td>
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<tr>
<td>Eight patients dropped out</td>
<td>Eight patients dropped out</td>
<td>Zero drop-out rate</td>
<td>Zero drop-out rate</td>
<td>Nine patients dropped out</td>
<td>Eleven patients</td>
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<tr>
<td><strong>Main Results</strong></td>
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<td><strong>Main Results</strong></td>
<td><strong>Main Results</strong></td>
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<tr>
<td>No advantage of a behavioral-graded activity program compared to usual care postoperative physical therapy</td>
<td>No advantage of a behavioral-graded activity program compared to usual care postoperative physical therapy</td>
<td>Outcomes favored exercise-and-education approach compared to no exercise or no education</td>
<td>Slight advantage of the exercise-only group compared to the advice group.</td>
<td>Outcomes favored the exercise-and-education and education-and-social-support groups.</td>
<td>No advantage of an intensive gym program compared to advice on resuming ADL’s short of pain</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability – General Perceived Effort</th>
<th>Disability – General Perceived Effort</th>
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<tr>
<td><strong>P-values (CI)</strong></td>
<td><strong>P-values (CI)</strong></td>
<td><strong>P-values (CI)</strong></td>
<td><strong>P-values (CI)</strong></td>
<td><strong>P-values (CI)</strong></td>
<td><strong>P-values (CI)</strong></td>
</tr>
<tr>
<td>No statistical difference between the 2 groups</td>
<td>No statistical difference between the 2 groups</td>
<td>Intensive exercise group faster to work than other 2: (p &lt; 0.001)</td>
<td>Pain less in the exercise group (p &lt; 0.05)</td>
<td>Café and video group had less pain than TG group (p &lt;0.03)</td>
<td>Patients in both groups improved (p = .001)</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------</td>
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<tr>
<td></td>
<td>67% of the UC group rated themselves as &quot;recovered&quot; compared to 48% of the BGA (95% CI). After adjusted analyses – no statistical significance</td>
<td>Significant difference between the exercise groups and the control group for Schober test: (p &lt; 0.001)</td>
<td>Low back outcome score better for exercise group at 12 months: (p &lt; 0.05)</td>
<td>Café group had better function compared to the other 2 groups: Carrying bags (p &lt; 0.01); Getting up from chair (p &lt; 0.01); Ascending stairs (p &lt; 0.01)</td>
<td>Minimal difference in return to work between the 2 groups (p = .65)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>VAS scores significantly better in intensive exercise group (p &lt; 0.001)</td>
<td>More in cafe group resumed work compared to the other 2 groups (p &lt; 0.04)</td>
<td>Video group had more contact with healthcare providers than other 2 groups (p &lt; 0.001)</td>
</tr>
</tbody>
</table>
Preoperative Education for Lumbar Spine Surgery Patients

<table>
<thead>
<tr>
<th>Authors</th>
<th>Clinical Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ostelo et al 2003a</td>
<td>Treatment principles derived from theories in chronic LBP may not apply to first-time lumbar disc surgery patients and behavioral-graded activities are not superior to usual care post-operative physical therapy.</td>
</tr>
<tr>
<td>Ostelo et al 2003b</td>
<td>Treatment principles derived from theories in chronic LBP may not apply to first-time lumbar disc surgery patients and behavioral-graded activities are not superior to usual care post-operative physical therapy.</td>
</tr>
<tr>
<td>Filiz et al 2005</td>
<td>Intensive exercise is more effective in reduction of pain and disability in patients with lumbar disc surgery.</td>
</tr>
<tr>
<td>Dolan et al 2000</td>
<td>A 4-week postoperative exercise program can improve disability and spinal function in patients who undergo micro-discectomy.</td>
</tr>
<tr>
<td>Christensen et al 2003</td>
<td>This study shows the importance of a coping and questions the role of intensive exercises in a rehabilitation program for spinal fusion patients.</td>
</tr>
<tr>
<td>Donaldson et al 2006</td>
<td>Extensive and comprehensive gym-based exercise programs are not superior to advice and education on ADL’s in disc surgery patients.</td>
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## Appendix 3  Critical Appraisal of Evidence of Effectiveness

**Reviewers:** Adriaan Louw and Quinette Louw  
**Author:** Filiz  
**Year:** 2005  
**Record Number:** 3.1

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<tr>
<td>1. Was the assignment to treatment groups random?</td>
<td>yes</td>
<td>no</td>
<td>not clear</td>
<td>NA</td>
</tr>
<tr>
<td>2. Were participants blinded to treatment allocation?</td>
<td>yes</td>
<td>no</td>
<td>not clear</td>
<td>NA</td>
</tr>
<tr>
<td>3. Was allocation to treatment groups concealed from the allocator?</td>
<td>yes</td>
<td>no</td>
<td>not clear</td>
<td>NA</td>
</tr>
<tr>
<td>4. Were the outcomes of people who withdrew described and included in the analysis?</td>
<td>yes</td>
<td>no</td>
<td>not clear</td>
<td>NA</td>
</tr>
<tr>
<td>5. Were those assessing the outcomes blind to the treatment allocation?</td>
<td>yes</td>
<td>no</td>
<td>not clear</td>
<td>NA</td>
</tr>
<tr>
<td>6. Were control and treatment groups comparable at entry?</td>
<td>yes</td>
<td>no</td>
<td>not clear</td>
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</tr>
<tr>
<td>7. Were groups treated identically other than for the named interventions?</td>
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<td>no</td>
<td>not clear</td>
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<tr>
<td>8. Were outcomes measured in the same way for all groups?</td>
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<td>no</td>
<td>not clear</td>
<td>NA</td>
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<tr>
<td>9. Were outcomes measured in a reliable way?</td>
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<td>no</td>
<td>not clear</td>
<td>NA</td>
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<tr>
<td>10. Was there adequate follow-up of participants? (&gt;80%)</td>
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<td>no</td>
<td>not clear</td>
<td>NA</td>
</tr>
<tr>
<td>11. Was appropriate statistical analysis used?</td>
<td>yes</td>
<td>no</td>
<td>not clear</td>
<td>NA</td>
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**Score:** 8/11  
**Overall appraisal:** Include  
Exclude  
Seek further info
Reviewers: Adriaan Louw and Quinette Louw
Author: Ostelo Year: 2003 (European Spine) Record Number: 3.2

1. Was the assignment to treatment groups random?
   yes no not clear NA

2. Were participants blinded to treatment allocation?
   yes no not clear NA

3. Was allocation to treatment groups concealed from the allocator?
   yes no not clear NA

4. Were the outcomes of people who withdrew described and included in the analysis?
   yes no not clear NA

5. Were those assessing the outcomes blind to the treatment allocation?
   yes no not clear NA

6. Were control and treatment groups comparable at entry?
   yes no not clear NA

7. Were groups treated identically other than for the named interventions?
   yes no not clear NA

8. Were outcomes measured in the same way for all groups?
   yes no not clear NA

9. Were outcomes measured in a reliable way?
   yes no not clear NA

10. Was there adequate follow-up of participants? (>80%)
    yes no not clear NA

11. Was appropriate statistical analysis used?
    yes no not clear NA

Score: 10/11
Overall appraisal: Include Exclude Seek further info

Comments (including reason for exclusion):
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Score: 10/11

Overall appraisal: **Include**

Comments (including reason for exclusion):
### Preoperative Education for Lumbar Spine Surgery Patients

**Reviewers:** Adriaan Louw and Quinette Louw  
**Author:** Donaldson  
**Year:** 2006  
**Record Number:** 3.4

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**Score:** 7/11  
**Overall appraisal:** Include  
**Comments (including reason for exclusion):**
## Preoperative Education for Lumbar Spine Surgery Patients

**Reviewers:** Adriaan Louw and Quinette Louw  
**Author:** Dolan  
**Year:** 2000  
**Record Number:** 3.5

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**Score:** 7/11  
**Overall appraisal:** Include  
**Exclude**  
**Seek further info**  

Comments (including reason for exclusion):
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Score: 4/11
Overall appraisal: **Include**
Exclude
Seek further info

Comments (including reason for exclusion):
Appendix 4: National Health and Medical Research Council (NH&MRC) Australia 2002

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<th>Evidence Level</th>
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<td>Evidence obtained from a systematic review of all relevant randomized controlled trials (RCT)</td>
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<tr>
<td>II</td>
<td>Evidence obtained from at least one properly-designed RCT</td>
</tr>
<tr>
<td>III – 1</td>
<td>Evidence obtained from well-designed pseudo-RCT (alternate allocation or some other method)</td>
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<tr>
<td>III – 2</td>
<td>Evidence obtained from comparative studies with concurrent controls and allocation not randomized (cohort studies), case-control analytic studies, or interrupted time series with a control group</td>
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<tr>
<td>III – 3</td>
<td>Evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel group</td>
</tr>
<tr>
<td>IV</td>
<td>Evidence obtained from case series, either post-test or pre-test and post-test</td>
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National Health and Medical Research Council (NH&MRC) Australia 2002
APPENDIX 5: LETTERS TO THE SURGEONS

November 19, 2005

Dear Dr. Clymer

Thank you for taking the time to read this research proposal.

I am currently working on a research project where we are interested in the educational needs of patients whom have recently undergone spinal surgery – laminectomy, laminotomy and/or discectomy, for lumbar radiculopathy.

We are asking area spine surgeons to consider being part of the research project by allowing patients at their first follow-up visit after surgery, complete a questionnaire related to their experience in surgery, which should not take more than 10 minutes to complete. (Please see the attached information). No personal data will be collected from any patient.

If this project interests you, and you agree to participate, I would ask that you please provide us with a written letter indicating permission to conduct the study at your clinic early in 2006.

Thank you for your consideration

Adriaan Louw, PT
Sports Rehab (913) 663-2555
International Spine & Pain Institute (816) 331-1877
ALouw@AOL.com
November 19, 2005

Dear Dr. Reintjes

Thank you for taking the time to read this research proposal.

I am currently working on a research project where we are interested in the educational needs of patients whom have recently undergone spinal surgery – laminectomy, laminotomy and/or discectomy, for lumbar radiculopathy.

We are asking area spine surgeons to consider being part of the research project by allowing patients at their first follow-up visit after surgery, complete a questionnaire related to their experience in surgery, which should not take more than 10 minutes to complete. (Please see the attached information). No personal data will be collected from any patient.

If this project interests you, and you agree to participate, I would ask that you please provide us with a written letter indicating permission to conduct the study at your clinic early in 2006.

Thank you for your consideration

Adriaan Louw, PT
Sports Rehab (913) 663-2555
International Spine & Pain Institute (816) 331-1877
ALouw@AOL.com
November 19, 2005

Dear Dr. Bernhardt

Thank you for taking the time to read this research proposal.

I am currently working on a research project where we are interested in the educational needs of patients whom have recently undergone spinal surgery – laminectomy, laminotomy and/or discectomy, for lumbar radiculopathy.

We are asking area spine surgeons to consider being part of the research project by allowing patients at their first follow-up visit after surgery, complete a questionnaire related to their experience in surgery, which should not take more than 10 minutes to complete. (Please see the attached information). No personal data will be collected from any patient.

If this project interests you, and you agree to participate, I would ask that you please provide us with a written letter indicating permission to conduct the study at your clinic early in 2006.

Thank you for your consideration

Adriaan Louw, PT
Sports Rehab (913) 663-2555
International Spine & Pain Institute (816) 331-1877
ALouw@AOL.com
APPENDIX 6: SURGEON APPROVAL LETTERS

CARONDELET ORTHOPAEDIC SURGEONS, P.C.
ORTHOPAEDIC SURGERY AND SPORTS MEDICINE
SUITE 426, CARONDELET MEDICAL BUILDING
1010 CARONDELET DRIVE
KANSAS CITY, MISSOURI 64114-4820
(816) 941-0200 FAX (816) 941-3035

JENNY CHANDRA, M.D.
Physical Medicine and Rehabilitation

Business Manager
WILLIAM P. HUSSEY, JR.

December 14, 2005
Sports Rehab
6362 College Blvd
Overland Park, KS 66211
ATTN: Adriaan Louw

Dear Adriaan:

As you represented in my office a few weeks ago, I understand you are trying to organize a study on preoperative education for spinal surgery patients. I would be happy for my patient to participate in this survey evaluation if they wish. Let this letter serve as my acknowledgement of your request and my approval for you by the Ethics Committee.

Sincerely,

David J. Clymer, M.D.
djc/jah
Dictated but not proofread
November 16, 2005

Adriaan Louw, Registered Physical Therapist
Sports Rehabilitation & Physical Associates, Inc.
6362 College Boulevard
Overland Park, Kansas 66211-1506

Dear Adriaan:

I have reviewed your clinical research proposal entitled, “Pre-operative Education for Patients Undergoing Spinal Surgery for Lumbar Radiculopathy”. I like the design of the study and would like to be an enthusiastic participant in the study.

I look forward to working with you in the future on this exciting patient educational project.

Sincerely yours,

Mark Bernhardt, M.D.
Clinical Professor
University of Missouri – Kansas City School of Medicine

MB/ETS, tm
Preoperative Education for Lumbar Spine Surgery Patients

January 23, 2006

Adriaan Louw
Sports Rehabilitation and Physical Therapy
College Blvd Office Park
6362 College Blvd.
Overland Park, KS 66211-1506

Dear Adriaan:

I have reviewed the information you provided me regarding the preoperative education for patients undergoing spinal surgery for a lumbar radiculopathy. I find the study very interesting and potentially beneficial. I consent to participating in the study but will present it to my partners on Monday for their approval.

Sincerely,

[Signature]

Stephen L. Reintjes, M.D.
Dictated but not proofread

[Address: 6675 Holmes, Ste. 420
Kansas City, MO 64131
(816) 333-9663
Fax: (816) 333-9433]
APPENDIX 7: EXAMPLE OF AN OPERATIVE REPORT

PREOPERATIVE DIAGNOSES: L1-4 spinal stenosis, right L3-L4 facet cyst, degenerative disk disease, degenerative spondylosis, right knee degenerative joint disease, and right knee osteoarthritis.

POSTOPERATIVE DIAGNOSES: L3-4 spinal stenosis, right L3-L4 facet cyst, degenerative disk disease, degenerative spondylosis, right knee degenerative joint disease, and right knee osteoarthritis.

OPERATIVE PROCEDURE: Decompression bilateral L3 and L4 nerve roots, decompression cauda equina, removal of facet cyst, bilateral posterior lumbar fusion L3-L4, autograft bone, vitreous bone graft, fluoroscopy, and right knee injection with 80 mg of Depo-Medrol and 5 mL of 0.5% bupivacaine.

ANESTHESIA: General.

ESTIMATED BLOOD LOSS: 350 mL.

FLUID REPLACEMENT: Crystalloid.

COMPLICATIONS: None.

INDICATIONS FOR THE PROCEDURE: This is an 82-year-old white female from Archie, Missouri, who presents with intractable right leg pain and low back pain. It was found by MRI to have a facet cyst on the right side of L3-L4, has failed conservative treatment and is brought to the operating room at this time for the above-stated surgical procedure. The risks of procedure, benefits, and postoperative plan have all been discussed with the patient and her husband in great detail. The risks of these procedures include but are not limited to bleeding, infection, anemia, pain, paralysis, sensory loss, death, need for further surgery, damage to blood vessels, nerves, and tendons, persistent back and/or leg pain, scar tissue formation, dura tear, etc. No guarantees of the successful surgical outcome have been stated or implied to the patient. All of this was understood and she wished to proceed.

Description of the Procedure: After informed consent was obtained, the patient was taken to operating room, placed in a supine position and underwent general anesthesia. She received preoperative antibiotics. The right knee was prepped in a sterile fashion and injected with 40 mL of Depo-Medrol and 5 mL of 0.5% Bupivacaine. She was then positioned on the Andrews frame and pressure points were well padded. Her back was prepped and draped in the usual sterile fashion. Using fluoroscopy, the site for the surgical incision was verified. An incision was made from the spinous process of L2 to the spinous process of L4 through skin and subcutaneous tissue. The linea alba was incised and the erector spinae muscles were carefully dissected off the spinous processes of lamina. Facets and the transverse processes of L3 and L4 were exposed again. Intraoperative radiograph using fluoroscopy was used to confirm the appropriate level with a towel clip placed on the spinous process of L3. The inferior portion of the spinous process of L3, and the superior portion of the spinous process of L4 were removed. A central decompression was then carried out using angled Kerrison rongeurs. Removed the laminae anteriorly at L4 and laminae inferiorly at L3. Ligamentum flavum was removed. There was noted to be significant hypertrophy of ligamentum flavum. There was also a large facet cyst, which extended into the L3-4 neural foramen. The facet cyst was removed. Again, as noted there was hypertrophic ligamentum flavum in the lateral recess as well, this was removed. Decompression was then carried out at the L3-4 nerve roots bilaterally. Next, the transverse processes of L3 and L4 bilaterally were decorticated. A Woodson elevator was used to ensure a thorough decompression. The back was thoroughly irrigated. Following that, autograft bone, which had been removed during the decompression was then morcellized with soft tissue. Elements removed and placed on bilateral posterolateral gutters. Vitreous was also placed in the bilateral posterolateral gutters at L3-4. Flo-Sol hemostatic sealant was placed over the dura posteriorly and worked around the exiting nerve roots bilaterally. The erector spinous muscles were re-approximated in the midline with a 0 PDS in a figure-of-eight interrupted fashion. The subcutaneous layer of skin was closed with a 3-0 Monocryl in a simple interrupted fashion with knots buried. The skin was closed with a 3-0 Monocryl in running subcuticular fashion. Mantle and Steri-Strips were applied along with sterile dressings. Note that the skin had been injected prior to the start of this procedure along with the erector spinae muscles. A total of 15 mL of 0.5% Bupivacaine with epinephrine was injected near each procedure. There were no operative complications. All counts were correct x 2. She was awakened, extubated, and transported to the...
APPENDIX 8: PATIENT INSTRUCTIONS AND CONSENT

PARTICIPANT INFORMATION LEAFLET & CONSENT FORM


REFERENCE NUMBER:

PRINCIPAL INVESTIGATOR: Adriaan Louw

ADDRESS: 1101 Brookside Place
Raymore, MO
64083
USA

CONTACT NUMBERS: (816) 318-8138 or (816) 331-1877

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Committee for Human Research at Stellenbosch University and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, common rule.

What is this research study all about?

- This study is a random sample of 1000 physical therapists residing in the Greater Kansas City Metropolitan Area.
- The aim of this study is to determine what content and method of education physical therapists regard as most important for patients undergoing spinal surgery for lumbar radiculopathy. The information gained from this study will provide the medical profession with a better understanding of what patients want prior to surgery and can therefore design pre-operative programs to help patients recover better after surgery.
- A random sample of 1000 physical therapists, licensed in Kansas and/or Missouri and who live in the Greater Kansas City Metropolitan Area have been chosen to receive a 6-page questionnaire related to spinal surgery. Completion of the questionnaire will take no more than 15 minutes. Therapists meeting the inclusion criteria will be asked to complete the questionnaire and return the questionnaire in the provided self-seal stamped envelope to the researcher within 60 days. A postcard will be sent to all therapists after 30 days thanking them for their participation and reminding them to please return the questionnaires. As questionnaires are returned, they will be checked off against the mail-out list and 15 days prior to the end of the 60-day period, therapists whom have not returned their questionnaires, will be contacted by phone by the researcher to ask therapists to please return the questionnaire, if they wish to participate in the study.
Why have you been invited to participate?

➢ You have been chosen by a randomized process to participate in this study since you are a licensed physical therapist in the either or both of the State of Missouri and Kansas and provide patient care within the Greater Kansas City Metropolitan Area.

What will your responsibilities be?

➢ By agreeing to participate in this study, you are asked to complete the 6-page questionnaire and return it to the researcher in the self-seal, postmarked envelope provided. Completing the questionnaire will take no more than 15 minutes.

Will you benefit from taking part in this research?

➢ There are no personal benefits by participating in this study. The aim of this study is to impact future spinal surgery patients, surgeons and physical therapists.

Who will have access to your personal records?

➢ No personal data will be recorded. The lists of physical therapists are public information and will be purchased for this study by the researcher.

Will you be paid to take part in this study and are there any costs involved?

➢ No you will not be paid to take part in the study. There will be no costs involved for you, if you do take part.

Is there any thing else that you should know or do?

➢ You can contact the Committee for Human Research, Stellenbosch University, Cape Town, South Africa, at 011-2721-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

➢ You will receive a copy of this information and consent form for your own records.
Declaration by participant

By signing below, I ....................................................... agree to take part in a research study entitled pre-operative education for patients undergoing spinal surgery for lumbar radiculopathy.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is voluntary and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (place) ........................................ on (date) ......................... 2005.

.......................................................... ........................................
Signature of participant Signature of witness

Declaration by investigator

I (name) .......................................................... declare that:

- I explained the information in this document to ..........................................................
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use a translator. (If a translator is used then the translator must sign the declaration below).

Signed at (place) ........................................ on (date) ......................... 2005.

.......................................................... ........................................
Signature of investigator Signature of witness
Dear patient
Thank you for participating in this study. The questionnaire you have received consists of 2 main sections.

Section 1 – Demographic and general information

- The first section of the questionnaire has 11 questions that will provide the researcher with additional information needed for the study. No personal data will be recorded and none of the answers will be disclosed to your surgeon, clinic or hospital. Please be make sure you answer each question.

Section 2 – Questions regarding your recent back surgery

- There are 32 questions.
- The 32 questions are grouped into 6 different sub-sections.
- Please read each question carefully. After each question, you are provided with a line, ranging from “not important” to “very important.” Please mark along the line with an X where you rate the importance of the questions being answered.

Example:
It is important for me to check the traffic report in the mornings, prior to leaving for work.

<table>
<thead>
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<th>Not Important</th>
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- At the end of each sub-section there are questions, where you are asked to make a choice based on the options provided. Please read the question carefully and choose one answer, by checking the appropriate box with an X.

Example:
In the mornings, I prefer:

- Coffee
- Tea
- Orange juice

- In the final section (section 6), you are also provided with open-ended questions, where you are asked to describe your thoughts/feelings about your surgery. Please provide feedback by writing out answers to your questions.

Thank you once again agreeing to participate in the study.
APPENDIX 9: DEMOGRAPHIC INFORMATION – PATIENT

Demographics and General Information

Thank you for your participation in this study. Please provide the most appropriate answer to each question. Please complete ALL questions. There is no right or wrong answer. All information will be handled in confidence and no personal data will be collected.

1. What is your age?  ________ years  ________ months

2. What is your sex?  ________ male  ________ female

3. What is your ethnic background?
   - □ African-American
   - □ Hispanic
   - □ White, non-Hispanic
   - □ Asian
   - □ Other: Please specify: ______________________________________

4. What is your educational background?
   - □ Post-graduate education (Masters, doctorate, etc.)
   - □ Graduate (Bachelors)
   - □ High school
   - □ Other. Please specify: ______________________________________

5. Which of the following describes your income best?
   - □ Less than $10 000 per year
   - □ Between $10 000 and $50 000 per year
   - □ Between $50 000 and $100 000 per year
   - □ More than $100 000 per year

6. Do you know the type of surgery you had?  _____ yes  _____ no
   
   If yes, please specify:
   - □ Laminotomy
   - □ Laminection
   - □ Laminection with discectomy
   - □ Other  Please specify: ______________________________________

6. What was the reason for your surgery? (Only choose one)
   - □ Pain
   - □ Numbness and/or pins and needles in the leg
   - □ Decreased function and mobility
   - □ Failed treatment
   - □ Other: Please specify: ______________________________________
7. Did you receive formal pre-operative education?
   □ Yes
   □ No

   If yes, please specify through which means:
   □ One-on-one education by the surgeon
   □ One-on-one education by the physician’s nurse/surgical technician
   □ One-on-one education by the physical therapist
   □ Handout/Booklet
   □ DVD/Video
   □ Other. Please specify: ____________________________________________

   If yes, did you find the pre-operative educational session beneficial?
   ________ yes  __________ no

   If no why not – please explain: ________________________________________

8. Did you search the Internet for information on your surgery? _______ yes _______ no

   If yes, did you find the Internet information beneficial?
   ________ yes  __________ no

9. Do you feel you were psychologically prepared for the surgical procedure?
   ________ yes  __________ no

10. Do you feel you were physically prepared for the surgical procedure?
    ________ yes  __________ no

11. Do you think pre-operative education is important for spinal surgery patients?
    □ Yes
    □ No

    Explain your answer:
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________
    ___________________________________________________________________
**APPENDIX 10: PATIENT QUESTIONNAIRE**

**Section 1: Surgical Procedure**

1. How important is it for you to know the exact reason for undergoing spinal surgery?

<table>
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<tr>
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2. How important is it for you to know the risks associated with the surgery?

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<tr>
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3. How important is it for you to know the alternative treatment options compared to the surgical procedure?

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</table>

4. How important is it for you to receive a detailed description/explanation of the exact surgical procedure?

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<tr>
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</table>

   I would like to know their motivation for their choice they made on the scale.

   Please explain your answer: _________________________________________________

Who would you prefer provide the information to you regarding the above section (section 1) on surgical procedures? Please choose only one.

- [ ] Surgeon
- [ ] Physician's nurse/assistant/technician
- [ ] Operating room nurse
- [ ] Physical therapist
- [ ] Other: Please specify________________________________

Of the 4 questions/statements **above**, please indicate which question/statement is the MOST important for you to being answered, related to surgical procedure, by only choosing one of the following:

- [ ] Reason for the surgery
- [ ] Risks associated with the surgery
- [ ] Alternate treatment options
- [ ] Description of the surgical procedure
### Section 2: Medical Care

1. **How important is it for you to know how long you will be under anesthesia?**

   - [ ] Not Important
   - [ ] Very Important

2. **How important is it for you to know if you need to stop taking medication prior to surgery?**

   - [ ] Not Important
   - [ ] Very Important

3. **How important is it for you to know how long the hospital stay will be?**

   - [ ] Not Important
   - [ ] Very Important

4. **How important is it for you to know if you need a back brace after surgery?**

   - [ ] Not Important
   - [ ] Very Important

5. **How important is it for you to know when you will see the surgeon at his/her office after surgery?**

   - [ ] Not Important
   - [ ] Very Important

Who would you prefer provide the information to you regarding the above section (section 2) on medical care? Please choose only one.

- Surgeon
- Physician's nurse/assistant/technician
- Operating room nurse
- Physical therapist
- Other: Please specify _____________________________

Of the 5 questions/statements above, please indicate which question/statement is the MOST important for you to being answered, related to medical care, by only choosing one of the following:

- Length of anesthesia
- Stop taking medication prior to surgery
- Length of hospital stay
- Back brace following surgery
- Follow-up office visit with the surgeon
Section 3: Prognosis, Symptoms and Recovery

1. How important is it for you to know how much of your pain before surgery will be gone after surgery?

   Not Important  |  Very Important

2. How important is it for you to know if there will be pain at the surgery site?

   Not Important  |  Very Important

3. How important is it for you to know about any other pain you may experience after surgery?

   Not Important  |  Very Important

4. How important is it for you to know how long it will take to experience complete loss of all pain?

   Not Important  |  Very Important

Who would you prefer provide the information to you regarding the above section (section 3) on symptoms, prognosis and recovery? Please choose only one.

- Surgeon
- Physician’s nurse/assistant/technician
- Operating room nurse
- Physical therapist
- Other: Please specify______________________________

Of the 4 questions/statements above, please indicate which question/statement is the MOST important for you to being answered, related to symptoms, prognosis and recovery, by only choosing one of the following:

- Relief of pre-surgical pain
- Surgical site pain
- Other pain
- Complete loss of symptoms
Section 4: Activities, Mobility and Physical Therapy

1. How important is it for you to know when you can go back to work after surgery?

   Not Important
   | Very Important

2. How important is it for you to know when you can start driving after surgery?

   Not Important
   | Very Important

3. How important is it for you to know about any limitations about activities such as bending, lifting, walking and sitting?

   Not Important
   | Very Important

4. How important is it for you to know if you will need physical therapy after surgery?

   Not Important
   | Very Important

5. How important is it for you to know what physical therapy will consist of?

   Not Important
   | Very Important

Please explain: ____________________________________________________________

Who would you prefer provide the information to you regarding the above section (section 4) on activities, mobility and physical therapy? Please choose only one.

- [ ] Surgeon
- [ ] Physician's nurse/assistant/technician
- [ ] Operating room nurse
- [ ] Physical therapist
- [ ] Other: Please specify ____________________________

Of the 5 questions/statements above, please indicate which question/statement is the MOST important for you to being answered, related to activity and physical therapy, by only choosing one of the following:

- [ ] Returning to work
- [ ] Start driving
- [ ] Limitation in activities
- [ ] Needing therapy after surgery
- [ ] Content of physical therapy
Section 5: Educational Preference

1. I would prefer to receive education prior to surgery by means of (please only choose one):
   - [ ] Education by one-on-one discussion with a healthcare provider
   - [ ] Education in a group setting with patients undergoing similar surgeries
   - [ ] Handout – booklet/pamphlet/papers
   - [ ] Video/DVD to view at home
   - [ ] Website I can visit
   - [ ] Other. Please specify: __________________________________________________________

2. Is there any other information you consider important for patients to know prior to spinal surgery?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

[Preoperative Education for Lumbar Spine Surgery Patients]
Section 6: Pain Section

1. At the time of your first follow-up visit with your surgeon, are you experiencing any pain?
   - [ ] Yes
   - [ ] No

   If NO – thank you for your participation in this study. Please put this questionnaire in the envelope provided and drop it off at the front desk upon your departure.

   If YES – please complete the following questions, pertaining to your pain

2. Please rate your pain on the following scale:

   - [ ] No Pain
   - [ ] Excruciating/Pain Severe Pain

3. Please identify your pain, by choosing only one of the following categories:
   - [ ] I have the same leg pain I experienced prior to surgery and the amount of pain I experience is the same as prior to surgery.
   - [ ] I have the same leg pain I experienced prior to surgery, but the amount of pain I experience is less than prior to surgery.
   - [ ] I have the same leg pain I experienced prior to surgery, but the amount of pain I experience is more than prior to surgery.
   - [ ] My leg pain is completely gone, but I have pain at the surgery site
   - [ ] Other. Please explain: __________________________________________________________

4. Please indicate on the body chart below, the area where you experience the most pain:
5. Describe your feelings/thoughts about the pain you are experiencing following surgery:

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

6. What do you do to manage/control the pain?

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

7. Did you expect to have pain after surgery?
   □ Yes
   □ No

8. Are you afraid the pain will get worse?
   □ Yes
   □ No

9. Are you hopeful all the pain will disappear?
   □ Yes
   □ No

10. What do you think is the cause of your pain after surgery?

11. Has any health professional provided you with education about post-operative pain? If yes, who provided the information?
   □ Yes – if so: Who? ________________________________
   □ No

12. Do you think that the information provided to you, prior to surgery, about post-operative pain was sufficient?
   □ Yes
   □ No

13. What other information do you think the surgeon should have told you about the pain prior to surgery?

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

14. What do you think should be done about your current pain?

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
### Checklist for Spinal Surgery Patient Educational Needs Questionnaire

1. Is the format of the questionnaire easy to follow?  
   - Yes  
   - No  
   
   If not, please explain your answer

2. Is the presentation of the questionnaire interesting?  
   - Yes  
   - No  
   
   Please motivate your answer

3. Does the structure of the questionnaire follow a logical layout?  
   - Yes  
   - No  
   
   Please motivate your answer

4. Are the instructions for completion of the questionnaire clear enough?  
   - Yes  
   - No  
   
   If not, please explain why?

5. Are the questions in the questionnaire direct and clear enough?  
   - Yes  
   - No  
   
   If not, which questions are ambiguous?

6. Does the questionnaire assess issues related to pre- and post-operative spinal surgery?  
   - Yes  
   - No  
   
   Please motivate your answer
7. Have all associated factors involved in pre-operative care for spinal surgery patients been addressed in this questionnaire? □ Yes □ No
Which other factors would you recommend need to be assessed?

8. Do any of the questions infringe on the correspondent’s privacy? □ Yes □ No
If yes, please state which question/s and why?

9. Do you have any other comments to make about the Spinal Educational Needs Questionnaire? □ Yes □ No

Thank you for your valuable comments and time.
APPENDIX 12: LETTER TO THE EXPERT PANEL - EXAMPLE

To Dr Grimmer

PRE-OPERATIVE EDUCATION FOR PATIENTS UNDERGOING SPINAL SURGERY FOR LUMBAR RADICULOPATHY

The above mentioned title is the subject of a research project as part of the MSc course in Physiotherapy, at Stellenbosch University in Cape Town, South Africa. The aim of this study is to contribute towards an understanding of pre-operative education for patients undergoing spinal surgery for lumbar radiculopathy.

Research has shown that 10-40% of patients undergoing spinal surgery have persistent pain and disability and post-operative rehabilitation programs have little evidence in their effectiveness. Increased understanding of patient’s pre-operative educational needs can impact patient care and outcomes in the field of spinal surgery. Once educational needs have been identified, further study can be performed to determine if pre-operative programs, initiated based on the patient’s needs, have superior outcomes and decrease disability. Superior outcomes would provide significant benefit to all medical personnel caring for the spinal surgery patient, including physical therapy in general and the role of the physical therapist in pre- and post-operative care for the spinal surgery patient.

Since the results of this study have the potential to positively influence the field of physical therapy, you are invited to help with the validation of the questionnaire designed specifically for this study. Two questionnaires were designed for this study – one for patients whom have recently undergone spinal surgery and one for therapists currently treating post-spinal surgery patient.
The questionnaires were designed after performing a systematic review of the literature and interviews with surgeons, therapists and nurses/surgical technicians. The questionnaires are distributed prior to a pilot study, to an expert panel in the fields of spinal surgery rehabilitation, questionnaire design and patient education. We would ask that you review the questionnaires and please provide feedback to the researcher by completing the attached checklist before December 15, 2005.

Thank you for your time and participation

A Louw (signed electronically) L C Crous (signed electronically)
Adriaan Louw Mrs. Lynette Crous
BSc Physio (US) Head of the Department
APPENDIX 13: PHYSIOTHERAPIST CONSENT and DEMOGRAPHICS

PARTICIPANT INFORMATION LEAFLET & CONSENT FORM


REFERENCE NUMBER:

PRINCIPAL INVESTIGATOR: Adriaan Louw

ADDRESS: 1101 Brookside Place
Raymore, MO
64083
USA

CONTACT NUMBERS: (816) 318-8138 or (816) 331-1877

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Committee for Human Research at Stellenbosch University and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, common rule.

What is this research study all about?

- This study is a random sample of 1000 physical therapists residing in the states of Kansas and Missouri.

- The aim of this study is to determine what content and method of education physical therapists regard as most important for patients undergoing spinal surgery for lumbar radiculopathy. The information gained from this study will provide the medical profession with a better understanding of what patients want prior to surgery and can therefore design pre-operative programs to help patients recover better after surgery.

- A random sample of 1000 physical therapists, licensed in Kansas and/or Missouri have been chosen to receive a 10-page questionnaire related to spinal surgery. Completion of the questionnaire will take no more than 15 minutes. Therapists meeting the inclusion criteria will be asked to complete the questionnaire and return the questionnaire in the provided self-seal stamped envelope to the researcher within 60 days. A postcard will be sent to all therapists after 30 days thanking them for their participation and reminding them to please return the questionnaires. As questionnaires are returned, they will be checked off against the mail-out list and 15 days prior to the end of the 60-day period, therapists whom have not returned their questionnaires, will be contacted by phone by the researcher to ask therapists to please return the questionnaire, if they wish to participate in the study.
Why have you been invited to participate?

- You have been chosen by a randomized process to participate in this study since you are a licensed physical therapist in the either or both of the State of Missouri and Kansas.

What will your responsibilities be?

- By agreeing to participate in this study, you are asked to complete the 6-page questionnaire and return it to the researcher in the self-seal, postmarked envelope provided. Completing the questionnaire will take no more than 15 minutes.

Will you benefit from taking part in this research?

- There are no personal benefits by participating in this study. The aim of this study is to impact future spinal surgery patients, surgeons and physical therapists.

Who will have access to your personal records?

- No personal data will be recorded. The lists of physical therapists are public information and will be purchased for this study by the researcher.

Will you be paid to take part in this study and are there any costs involved?

- No you will not be paid to take part in the study. There will be no costs involved for you, if you do take part.

Is there any thing else that you should know or do?

- You can contact the Committee for Human Research, Stellenbosch University, Cape Town, South Africa, at 011-2721-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

- You may, upon request, receive a copy of this information and consent form for your own records.
Declaration by participant

By signing below, I ............................................................. agree to take part in a research study entitled pre-operative education for patients undergoing spinal surgery for lumbar radiculopathy.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is voluntary and I have not been pressurized to take part.
- I may choose to leave the study at any time and will not be penalized or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (place) .................................................. on (date) .............................. 2005.

.......................................................... ..........................................................  
Signature of participant  Signature of witness

Declaration by investigator

I (name) ............................................................. declare that:

- I explained the information in this document to ..................................................
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use a translator. (If a translator is used then the translator must sign the declaration below.

Signed at (place) .................................................. on (date) .............................. 2005.

.......................................................... ..........................................................  
Signature of investigator  Signature of witness
Preoperative Education for Lumbar Spine Surgery Patients

Physical Therapist Questionnaire - Section 1: Demographic Data Sheet

Thank you for your participation in this study. Please provide the most appropriate answer to each question. Please complete ALL questions. There is no right or wrong answer. All information will be handled in confidence and no personal data will be collected.

1. What is your age? ___________ years ___________ months

2. What is the highest physical therapy degree you have?
   - PhD
   - DPT
   - Masters
   - Bachelors
   - Other: _________________________

3. Do you have a formal specialty certification?
   - Yes ____________ No ____________
   If yes, please select the most applicable certification:
   - Orthopedic certified specialist (OCS)
   - Geriatric certified specialist (GCS)
   - Pediatric certified specialist (PCS)
   - Neurological certified specialist (NCS)
   - Certified strength and conditioning specialist (CSCS)
   - Manual therapy (CMT, FAAOMPT, COMT, Dip., other)
   - Other. Please specify: _________________________

4. What is your current employment status?
   - Full time
   - Part time
   - PRN (as needed)

5. Have you personally undergone lumbar spine surgery?
   - Yes
   - No

6. Describe the primary setting of your current practice:
   - In-patient acute care
   - In-patient orthopedics
   - Out-patient orthopedics at a hospital
   - Out-patient orthopedics at a private practice
   - Sports Medicine clinic
   - Academic (teaching) institution
   - Other: _________________________
Preoperative Education for Lumbar Spine Surgery Patients

7. How many years have you been practicing as a physical therapist? ______ years*

* If you answered less than 2 years of clinical experience, we ask that you DO NOT continue with the questionnaire. Please go ahead and mail us your questionnaire in the envelope provided. Thank you for your time and participation.

8. In your current clinical practice, do you treat post-spinal surgery patients?
   - Yes
   - No**

** If you answered NO to question 8 (not currently treating post-operative spinal surgery patients) we ask that you DO NOT continue with the questionnaire. Please go ahead and mail us your questionnaire in the envelope provided. Thank you for your time and participation.

9. Do you provide any pre-operative education to patients undergoing spinal surgery in your current clinical setting?
   - Yes – formal program
   - Yes – informally (while performing conservative management pre-operatively)
   - No

   If yes to the above question (formally and/or informally), please specify through which means you provide pre-operative education to patients:
   - Pamphlet/handout/booklet
   - Video/DVD
   - Spine model and one-on-one discussion
   - Website/Internet
   - Other: ________________

10. Do the spine surgeons whom you work with, provide pre-operative education to their patients?
    - Yes
    - No
    - Not sure
11. Do you think pre-operative education is needed in spine surgery patients?
   - Yes 
   - No
   Explain your answer:
   ________________________________
   ________________________________
   ________________________________

If yes (you think pre-operative education is needed for spine surgery patients) to the above question, who should perform the pre-operative education?
   - Surgeon
   - Surgical technician/physician nurse
   - Physical therapist
   - Other: ________________________________

12. Do you think spinal surgery education should be done pre-operatively or immediate post-operatively?
   - Pre-operatively
   - Post-operatively

13. Do you think patients who receive pre-operative education for spinal surgery will have better outcomes in pain rating, functional abilities and decreased anxiety/fear?
   - Yes
   - No

14. In your undergraduate physical therapy training, did your curriculum contain any information on providing pre-operative education for spinal surgery patients?
   - Yes
   - No
Dear therapist

Thank you for participating in this study. The questionnaire you have received consists of 2 main sections.

Section 1 – Demographic and general information

- The first section of the questionnaire has 15 questions that will provide the researcher with additional information needed for the study. No personal data will be recorded.

- Please answer each question by providing the answer which best describes you in relation to the questions.

- On question 7 (how many years you have been practicing as a physical therapist), if you answered less than 2 years clinical experience, we ask that you DO NOT continue with the questionnaire. Please stop at this point and return the questionnaire to us in the envelope provided. Thank you very much for your participation.

- On question 8 (do you, in your current clinical practice, treat post-spinal surgery patients), if you answered NO to question 7 (not currently treating post-operative spinal surgery patients) we ask that you DO NOT continue with the rest of the questionnaire. Please stop at this point and return the questionnaire to us in an envelope provided. Thank you very much for your participation.

Section 2 – Questions regarding your experience with patients undergoing spinal surgery

- There are 30 questions.

- The 30 questions are grouped into 6 different sub-sections.

- Please read each question carefully. After each question, you are provided with a line, ranging from “not important” to “very important.” Please mark along the line with an X where you rate the importance of the questions being answered.

Example:

It is important for me to check the traffic report in the mornings, prior to leaving for work.

<table>
<thead>
<tr>
<th>Not Important</th>
<th>X</th>
<th>Very Important</th>
</tr>
</thead>
</table>

- At the end of each sub-section there are questions, where you are asked to make a choice based on the options provided. Please read the question carefully and choose one answer, by checking the appropriate box with an X.

Example: In the mornings, I prefer:

- ☐ Coffee
- ☐ Tea
- X Orange juice

Thank you once again agreeing to participate in the study.
APPENDIX 15: PHYSIOTHERAPIST QUESTIONNAIRE

Section 1: Surgical Procedure

1. How important is it for your patients to know the exact reason for undergoing spinal surgery?

- Not Important
- Very Important

2. How important is it for your patients to know the risks associated with the surgery?

- Not Important
- Very Important

3. How important is it for your patients to know the alternative treatment options compared to the surgical procedure?

- Not Important
- Very Important

4. How important is it for your patients to receive a detailed description/explanation of the exact surgical procedure?

- Not Important
- Very Important

Who do you think should provide the information to your patient regarding the above section (section 1) on surgical procedures? Please choose only one.

- Surgeon
- Physician's nurse/assistant/technician
- Operating room nurse
- Physical therapist
- Other: Please specify ____________________________

Of the 4 questions/statements above, please indicate which question/statement is the MOST important for your patients to being answered, related to surgical procedure, by only choosing one of the following:

- Reason for surgery
- Risk associated with surgery
- Alternative treatment to surgery
- Explanation of the surgical procedure
Section 2: Medical Care

1. How important is it for your patients to know how long they will be under anesthesia?

<table>
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<tr>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
</table>

2. How important is it for your patients to know if they need to stop taking medication prior to surgery?

<table>
<thead>
<tr>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
</table>

3. How important is it for your patients to know how long the hospital stay will be?

<table>
<thead>
<tr>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
</table>

4. How important is it for your patients to know if they need a back brace after surgery?

<table>
<thead>
<tr>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
</table>

5. How important is it for your patients to know when they will see the surgeon at his/her office after surgery?

<table>
<thead>
<tr>
<th>Not Important</th>
<th>Very Important</th>
</tr>
</thead>
</table>

Who would you think should provide the information to your patient regarding the above section (section 2) on medical care? Please choose only one.

- Surgeon
- Physician’s nurse/assistant/technician
- Operating room nurse
- Physical therapist
- Other: Please specify________________________________

Of the 5 questions/statements above, please indicate which question/statement is the MOST important for your patient to being answered, related to medical care, by only choosing one of the following:

- Length of anesthesia
- Stopping medication prior to surgery
- Length of hospital stay
- Back brace after surgery
- Follow up visit at the surgeon’s office
Section 3: Prognosis, Symptoms and Recovery

1. How important is it for your patients to know how much of their pain before surgery will be gone after surgery?

2. How important is it for your patients to know if there will be pain at the surgery site?

3. How important is it for your patients to know about any other pain they may experience after surgery?

4. How important is it for your patients to know how long it will take to experience complete loss of all pain?

Who do you think should provide the information to your patient regarding the above section (section 3) on symptoms, prognosis and recovery? Please choose only one.

- Surgeon
- Physician’s nurse/assistant/technician
- Operating room nurse
- Physical therapist
- Other: Please specify ________________________

Of the 4 questions/statements above, please indicate which question/statement is the MOST important for your patient to being answered, related to symptoms, prognosis and recovery, by only choosing one of the following:

- Pre-operative pain relief
- Surgery site pain
- Other pain
- Complete loss of pain
**Section 4: Activities, Mobility and Physical Therapy**

1. How important is it for your patient to know when they can go back to work after surgery?

   - Not Important
   - Very Important

2. How important is it for your patient to know when they can start driving after surgery?

   - Not Important
   - Very Important

3. How important is it for your patient to know about any limitations about activities such as bending, lifting, walking and sitting?

   - Not Important
   - Very Important

4. How important is it for your patient to know if they will need physical therapy after surgery?

   - Not Important
   - Very Important

5. How important is it for your patient to know what physical therapy will consist of?

   - Not Important
   - Very Important

   **Explain:**

   __________________________________________________________
   __________________________________________________________

Who do you think should provide the information to your patient regarding the above section (section 4) on activities, mobility and physical therapy? Please choose only one.

- Surgeon
- Physician’s nurse/assistant/technician
- Operating room nurse
- Physical therapist
- Other: Please specify ________________________________

Of the 5 questions/statements above, please indicate which question/statement is the MOST important for your patient to be answered, related to activity/physical therapy, by only choosing one of the following:

- Returning to work
- Start driving
- Limitations with activities
- Needing physical therapy after surgery
- Content of physical therapy
Section 5: Educational Preference

1. I think my patients would prefer to receive education prior to surgery by means of (please only choose one):
   - Education by one-on-one discussion with a healthcare provider
   - Education in a group setting with patients undergoing similar surgeries
   - Handout – booklet/pamphlet/papers
   - Video/DVD to view at home
   - Website I can visit
   - Other. Please specify: ___________________________________________

2. Is there any other information you consider important for patients to know prior to spinal surgery?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Preoperative Education for Lumbar Spine Surgery Patients

**Section 6: Pain Section**

1. What percentage of patients following surgery do you think still experience some pain? _______%

2. What do you think is the average pain rating of patients following spinal surgery for lumbar radiculopathy?

   - No Pain
   - Excruciating/Severe Pain

3. Describe the feelings/thoughts patients convey to you about their pain, if they still experience pain following the surgery.

   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

4. What do patients commonly do to manage/control pain after spinal surgery?

   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

5. Do you think patients benefit from education about their PAIN post-operatively?

   □ Yes
   □ No

   Please explain:
   ____________________________________________________________
   ____________________________________________________________

6. Do you think patients are interested in their prognosis – related to the pain following surgery?

   □ Yes
   □ No

   Please explain:
   ____________________________________________________________
   ____________________________________________________________

7. Do patients expect to have pain after surgery?

   □ Yes
   □ No
8. In your experience, what do you think the surgeon should have told your patient about the pain prior to surgery?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

9. In your experience, what do patients think should be done about their pain after surgery?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________
APPENDIX 16: LETTER TO PHYSIOTHERAPISTS

To whom it may concern:

PRE-OPERATIVE EDUCATION FOR PATIENTS UNDERGOING SPINAL SURGERY FOR LUMBAR RADICULOPATHY

The above mentioned title is the subject of a research project as part of the MSc course in Physiotherapy, at Stellenbosch University in Cape Town, South Africa. The aim of this study is to contribute towards an understanding of pre-operative education for patients undergoing spinal surgery for lumbar radiculopathy. **We would like to invite physiotherapists with 2 years of working experience and involved in treating post-spinal surgery patients to participate in this study.**

Research has shown that 10-40% of patients undergoing spinal surgery have persistent pain and disability and that post-operative rehabilitation programs have little evidence in their effectiveness. Increased understanding of the patient’s pre-operative educational needs can impact patient care and outcomes in the field of spinal surgery. Once educational needs have been identified, further study can be performed to determine if pre-operative programs, initiated based on the patient’s needs, have superior outcomes and decrease disability. Superior outcomes would provide significant benefit to all medical personnel caring for the spinal surgery patient, including physical therapy in general and the role of the physical therapist in pre- and post-operative care for the spinal surgery patient.

Since the results of this study has the potential to positively influence the field of physical therapy, you are invited to participate in this study by completing the questionnaire and demographic information sheet and return the questionnaires in the self-sealing envelope (provided) before **March 31, 2006**. The questionnaire should not take more than 15 minutes to complete.

Results upon completion of the study will be eligible for publication. No personal data will be collected.

The results of this study may help design an optimal pre-operative educational program, thus decreasing disability following spinal surgery. Furthermore, it may make therapists more aware of the educational needs pre-operatively, possibly leading to formal pre-operative education programs by physical therapists in the spinal surgery population.
Thank you for your time and participation

Adriaan Louw  
BSc Physio (US) 

Mrs. Lynette Crous  
Head of the Department
APPENDIX 17: POSTCARD REMINDER FOR PHYSIOTHERAPISTS

Dear Colleague

Approximately 1 month ago, we mailed a package to you, containing a questionnaire we are using in a research project on PREOPERATIVE EDUCATION FOR SPINAL SURGERY.

If you have already mailed back your completed questionnaire - thank you very much! The results from this research project will greatly benefit the physical therapy profession, spine surgeons and our patients.

If you have not completed it yet, I ask that you please consider completing the questionnaire and return it to us in the envelope provided in the package. If you have misplaced the questionnaire, please feel free to download another questionnaire from our website www.ispinstitute.com, by clicking on the spinal research button. If you need any further help - please let us know.

Sincerely,

Adriaan Louw, PT
ISPI: (816) 331-1877
APPENDIX 18: BODY CHART

- **Spine:** L1 spinal level to a line above the greater trochanter
- **Below the hips:** Line below the greater trochanter to above the knee
- **Below the knees:** Knee height to malleoli
- **Below the ankles:** Below the malleoli