2007

The Effects of Lumbar Stabilization Exercises on Low Back Pain

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The Effects of Lumbar Stabilization Exercises on Low Back Pain

by

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Doctor of Physical Therapy
December 14, 2007

A Scholarly Project Submitted to the Graduate Faculty of the
Department of Physical Therapy
School of Medicine
University of North Dakota

in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy

Grand Forks, North Dakota

December, 2007

This Scholarly Project, submitted by Susie McGarry in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

(Graduate School Advisor)

(Chairperson, Physical Therapy)

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Date Nov. 8, 2007

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ABSTRACT

Background and Purpose: The purpose of this article is to describe the six-week outpatient physical therapy treatment of a patient with acute low back pain due to a motor vehicle accident. **Case Description:** The patient was a 34-year-old female who presented with decreased lumbar range of motion, pain, decreased abdominal strength, and muscle spasms. The treatment for this patient included lumbar stabilization exercises, stretching, manual therapy, and soft tissue mobilizations. **Outcomes:** Following the physical therapy intervention, the patient exhibited full range of motion, decreased pain, and the ability to maintain a neutral pelvis without verbal or manual cues. The patient was able to perform all work duties and activities of daily living pain free. **Discussion**: This case illustrates the success of treating low back pain with a lumbar stabilization program.

Key Words: Low back pain, core strengthening, stabilization exercise

CHAPTER I

INTRODUCTION

Low back pain (LBP), a common therapeutic problem that often results in much suffering and substantial social loss.[1] Low back pain often settles quickly, but recurrence rates range from 60 to 85% in the first year after the acute episode.[2] It has also been documented that 2-3% of patients develop chronic, disabling low back pain after an acute episode.[3] The diagnosis and treatment of LBP is difficult as clinicians are often unsuccessful in identifying structural faults in patients with LBP.[4] The physical therapy evaluation is an important tool in determining which type of treatment is most appropriate since patients with low back pain are not a homogenous group.[5] Many treatments for LBP are ineffective as the etiology for LBP is often unclear.[6]

Several studies suggest that low back pain is frequently a result of lumbar instability. [7,8] Lumbar spinal instability (LSI) is defined as a loss of control or excessive motion in the spine's neutral zone, which is associated with muscle weakness, injury, and degenerative disk disease.[9,10] Spinal instability is often diagnosed by the prone instability test (PIT).[4,8] The PIT works on the hypothesis that if pain is present with passive provocation testing of the spine but disappears with activation of the spinal extensors, then the muscle recruitment may be able to stabilize the particular segment and reduce pain. Spinal stabilization exercises are often prescribed to increase spinal stability and reduce pain.[8] Increasing evidence has found that trunk muscle function plays an important role in maintaining spinal stability.[11] Arokoski et al[12] found that simple therapeutic exercises are effective in targeting both paraspinal and abdominal musculature, which are the muscles most commonly activated with stabilization exercises.

Hides et al[13] found that patients with acute first-episode LBP who received medical management and resumption of normal activity along with specific spinal stabilization exercises experienced fewer recurrences of LBP long term than subjects who received only medical management and the resumption of normal activity. The patients in the control group were 12 times more likely to experience LBP in the year after the initial episode than the patients in the exercise group (x^2 (1) = 12.41, P<0.001). In years two to three, the control group was nine times more likely to experience recurrences of LBP compared to the exercise group (x^2(1) = 9.31, P<0.01). A study by Goldby et al[14] found that a spinal stabilization program is more effective over time in treating chronic LBP than education or manual therapy. The spinal stabilization group demonstrated statistically significant improvements at six months in pain and dysfunction, and at one year a reduction in medication, disability, and dysfunction. A randomized control trial was used in this study with a large sample size of 346 subjects.

The purpose of this case report is to describe the management of a patient whose signs and symptoms are suggestive of lumbar spinal instability. Few studies have been performed to research the effects that stabilization exercises have on LBP.

CHAPTER II

CASE DESCRIPTION

EXAMINATION, EVALUATION, AND DIAGNOSIS

This patient is a 34-year-old female who complained of LBP following a motor vehicle accident in June of 2005. The patient was stopped at a traffic light, and was hit head on by another vehicle that was moving at approximately 20 miles per hour. The patient was seen in the emergency room the morning following the accident with complaints of pain and stiffness in her low back. The patient was given Motrin for pain relief in the emergency room, and no x-rays were taken at that time. She then was seen by physical therapy 12 days after the accident for evaluation and treatment of LBP. The patient reported the pain and stiffness had been fairly constant since the accident, and that she had no previous history of LBP. The aggravating factors for this patient included activities such as pushing, pulling, bending, running, lifting, reaching overhead, and sitting or standing for extended periods of time. The only relieving factor for this patient was to lay supine. She denied lower extremity numbness and tingling, and her pain level at the initial evaluation was 6/10. She also denied bowel or bladder problems.

This patient worked as an administrative assistant in the United States Army, which required prolonged sitting and computer usage. She often participated in training that involved heavy lifting and road marching with heavy gear. The Army has strict fitness standards, so she was also required to participate in a daily exercise routine that included running and weight lifting. This patient appeared to lead a healthy lifestyle while refraining from smoking, drug, or

alcohol use. The patient's physical therapy goals were to reduce her pain level, increase her range of motion, and to be able to perform her work duties and activities of daily living pain free.

Patient's past medical history was remarkable for diabetes mellitus and hypertension, and the medications that the patient was taking at the time of evaluation included Motrin, Metformin, Lisinopril, and Trazadone. Motrin was taken for the low back pain, and the primary side effect with this medication is gastrointestinal disturbances.[15] These disturbances may include abdominal pain, nausea/vomiting, constipation, diarrhea, and gastritis. Fortunately, the side effects associated with Motrin do not usually affect the physical therapy treatment. Metformin was prescribed for her diabetes, and the main side effect of this medication is also gastrointestinal disturbances with possible nausea/vomiting, diarrhea, abdominal discomfort, and flatulence.[16] A more serious but rare side effect of metformin is lactic acidosis. The signs and symptoms of lactic acidosis include malaise, myalgia, respiratory distress, and somnolence. The physical therapist must be aware of these side effects as lactic acidosis has the potential to be fatal. Lisinopril was prescribed for this patient's hypertension, and the most common side effects include orthostatic hypotension, fatigue, sinus tachycardia, dizziness, syncope, and headache.[17] In the rehabilitation setting it is important for the therapist to recognize these potential effects and alter the treatment plan accordingly. Slow positional changes are necessary to avoid orthostatic hypotension, and certain activities may have to be avoided to prevent dizziness or syncope. Trazadone is often prescribed for depression, anxiety, or insomnia, but the patient did not specify why she was taking this particular medication.[18] The most common side effect of trazadone is drowsiness, affecting up to 40% of the individuals taking it. The other side effects include include dizziness, lightheadedness, nervousness, fatigue, and confusion. Suicidal

ideation is possible in any patient with major depressive disorder, and patients with depression often display aggressiveness, akathisia, anxiety, insomnia, and irritability. It is crucial that the physical therapist monitor for these signs and symptoms and obtain the appropriate help for the patient if suicidal thoughts are observed. Fortunately, this particular patient did not exhibit any side effects from her prescribed medications during her physical therapy intervention.

The examination technique was based upon the orthopedic evaluation of the lumbar spine by Magee.[19] Upon observation, no abnormalities were noted and the patient demonstrated a normal gait pattern. However, increased abdominal girth was observed. Trunk active range of motion (AROM) was measured with a single inclinometer and was as follows:

Table 1. Thoracolumbar Range of Motion (in Degrees)

	Initial	Discharge
Flexion	68*	92
Extension	30	29
Right Sidebending	30	30
Left Sidebending	30	32
Right Rotation	22*	31
Left Rotation	27*	30

*Pain and tightness in low back

Waddell et al[20] found that trunk range of motion measurements are highly reliable when measured with a single inclinometer (intraclass correlation coefficient range, .86-.95). This

particular patient was limited in flexion and right and left rotation at initial evaluation. Lumbar spine special tests including the Straight Leg Raise, Modified Slump test, Femoral Nerve Traction test, and March test were all negative. These special tests were performed to rule out any neurological involvement or sacroiliac dysfunction. Muscle testing of the lower extremities with resisted isometrics demonstrated 5/5 for all motions. Mild hypomobility and pain were noted with passive accessory intervertebral movement (PAIVM) testing of T10-L5, and palpation revealed moderate tenderness and spasms of the bilateral thoracic and lumbar paraspinals T10-L5. Sensation testing of L1-S2 was equal bilaterally with evaluation through light touch. The patient's pain level was measured with the 0-10 visual analog scale, with 0 equaling no pain, and 10 signifying severe pain. The patient's pain level with movement at initial evaluation was 6/10, and 3/10 with rest . The initial examination was limited as the patient arrived late for her appointment. The original diagnosis was lumbar strain with the limited information available.

A follow-up evaluation was scheduled a few days later so further testing could be performed. The patient's second visit was valuable in providing the information needed to make an accurate diagnosis. Hip special tests were performed first to rule out any hip pathology. These tests included the Faber's test and Ober's test, which were both negative. Hip active and passive range of motion was also within normal limits and pain free. The patient also did not exhibit a leg length discrepancy. The PIT (Prone Istability Test) was then performed to assess lumbar spinal instability.[4,8] This test was positive for pain when the back extensors were not contracted, which is indicative of lumbar instability. Reliability has been found for the PIT, but validity has not been studied.[4] Muscle testing for the abdominals demonstrated 4/5 for the upper

abdominals with an active sit-up and 3/5 for the lower abdominals with the bilateral straight leg raise. The active sit-up and straight leg raise for abdominal strength have shown to be valid and reliable in a previous study.[20] Quadriceps and hamstring length were evaluated and found to be normal bilaterally. Heel/toe walking was also normal. Active range of motion for trunk flexion was 73 degrees, with mild stiffness and pain in the low back. The patient also complained of a "catch" with lumbar flexion, which is a sign of LSI.[21] The lower thoracic and lumbar paraspinals were still painful upon palpation with muscle spasms noted. Posterior-Anterior (PA) glides did not demonstrate any restricted motion in the lower thoracic and lumbar spine, but they were painful. Passive physiologic intervertebral movements (PPIVM) were normal for the thoracic and lumbar spine. Research has found that PAIVM and PPIVM testing is specific, but not sensitive for the detection of rotation or translational LSI.[22] Positive PAIVM and extension PPIVM tests had likelihood ratios that were statistically significant for diagnosing translational LSI.

A review of the cardiovascular/pulmonary system, integumentary system, musculoskeletal system, and neuromuscular system was performed to examine the physiological status of these areas.[23] The patient's communication ability, cognition, affect, and orientation were also assessed to determine if the patient had any special needs that needed to be addressed. The only area that the patient demonstrated any deficits was in the musculoskeletal system.

Through the initial and second evaluation, the data indicated that the patient's signs and symptoms were consistent with a lower thoracic/lumbar strain with probable lumbar instability. The patient did not appear to have any disc or neurological involvement as she did not exhibit

any lower extremity pain, lower extremity weakness, or lower extremity sensation impairments. Lumbar spinal instability was determined as the patient demonstrated a positive prone instability test[4,8] and "catch"[21] with lumbar flexion. Therefore, the patient may benefit from stabilization exercises. The restricted motion and pain with PA glides of the vertebrae on the initial visit was most likely due to guarding from the paraspinal spasms and pain. The patient was still in the subacute stage, so this improved her prognosis since she was treated early.

Several impairments and functional limitations were noted for this patient, which gave the therapist many items to focus on. The impairments observed included weak abdominal strength, decreased ROM, pain, and muscle spasms. The functional limitations noted were that the patient was unable to exercise for one hour without discomfort, and that she was unable to sit or stand for extended periods of time. This particular patient fell under the physical therapy diagnosis of 4B: Musculoskeletal practice pattern, Impaired posture in the Guide to Physical Therapy Practice.[23] The ICD-9 Code is 724.2.

PROGNOSIS AND PLAN OF CARE

The prognosis for this patient is that she will achieve the maximal level of function at home, work, and in the community.[23] The expected number of visits for her diagnosis is 6-20, and it is anticipated that 80% of patients will achieve the appropriate goals within this number of visits. This particular patient was extremely motivated during her treatment sessions as she was serving in the United States Army. The United States was involved in several conflicts around the world at the time of her injury, including the "war on terror", and this patient was determined to recover and serve her country to the best of her ability. The short term goals included

decreasing pain to 3/10 to enable her to perform her work duties with less discomfort, and independence with her home exercise program (HEP) to protect her back and prevent further injury. These goals were to be achieved in three weeks. The long term goals included decreasing pain to 1/10 to enable her to perform ADL's and work duties painfree, to increase lumbar ROM to WFL to enable her to perform stretching exercises in full range, and to increase abdominal and paraspinal strength to enable her to maintain lumbar spine stability and prevent further injury to her low back. These goals were to be achieved in six weeks.

INTERVENTION

The patient's plan of care was directed towards improving spinal stability with stabilization exercises. Stabilization exercises were chosen since instability was noted with the PIT and the patient complained of a "catch" with forward flexion of the trunk. The objective of the intervention was to enhance the function of the torso muscles in order to spare the spine from re-injury.[24] Research has found that the motor control system is able to control stability of the joints through muscle co-activation that is coordinated. Many lumbar stabilization programs concentrate on the deep muscle system that includes the multifidi and transversus abdominis (TrA).[25,26] The multifidi control vertebral movement in order to protect the articular structures, disks, and ligaments from excessive bending and injury.[25] The transversus abdominus stiffens the spine by increasing the intra-abdominal pressure.[26] Evidence has found that this deep stabilizing system is often dysfunctional with low back pain.[7] In addition, other trunk muscles contributing to stability include the latissimus dorsi, the internal and external obliques, and the rectus abdominus.[27] These muscles affect lumbar stability and stiffness, particularly when carrying weights. Kavcic et al[28] found that there is no single muscle that is superior in providing

stability of the spine, and that consideration must be given to each potential stabilizer when a lumbar spine stability program is established.

This patient was seen one time per week for thirty minute sessions for five weeks. However, the first week included two visits since the patient was late for her initial appointment. The first visit consisted of joint mobilizations with grade II central PA glides of T10-L5. Manual therapy techniques are thought to assist patients with lumbar dysfunction through activation of joint mechanoreceptors.[29] These receptors are thought to change the spasm and pain cycle by inhibiting hypertonic muscles A study by Hanrahan[30] found that grade I and II joint mobilizations are helpful in reducing acute LBP and increasing the ability of the paraspinal musculature to produce force. Hand placement for this intervention consisted of the thumb over thumb technique on the spinous processes with the direction of force given anteriorly. Paraspinal circles were then performed on the bilateral thoracic and lumbar paraspinals T10-L5 to help decrease pain and muscle spasms. The patient was instructed in a home exercise program of the double knees to chest (DKTC) stretch in supine, lumbar rotation stretch in supine, and the gas pedal stretch. The gas pedal stretch is performed in long-sitting with one knee bent and one leg straight. The patient then twists the trunk to wrap the opposite hand around the foot of the bent leg. This is used to stretch the thoracic paraspinals. These stretches were to be performed two times a day with five repetitions and a thirty second hold. The patient was also educated in the importance of positional changes to avoid further stiffness in her low back.

On the second visit, the patient reported that she felt less stiffness in her low back with forward flexion. The evaluation was completed on this date since the initial examination was

limited. The diagnosis of lumbar instability was made at this visit due to the evaluation findings. The second treatment consisted of paraspinal circles to the lower thoracic and lumbar paraspinals, as well as grade I/II PA glides to the T10-L5 spinous processes for pain relief. On this day the patient was thoroughly educated regarding her diagnosis and the effect that increased weight has on the low back. She was instructed in proper lifting techniques including bending at the knees, using a wide base of support, and avoiding twisting when lifting. She was also educated on the role of the stabilizing muscles of the spine, and the importance of maintaining a neutral spine with all activities. The patient was instructed in the cat/camel flexion/extension exercise to floss the nerve roots. This was intended as a motion exercise rather than a stretch. She was also instructed in abdominal hollowing and bracing in supine. She was instructed to perform these exercises two times per day with 10 repetitions. The patient required verbal and manual cues to perform these exercises correctly, and she required verbal cues for proper diaphragmatic breathing.

The patient began noticing a decrease in pain on the third visit. She rated the pain as 3/10 at that time, with 0/10 at the best. She was also able to work with less discomfort, and pushing and pulling activities were no longer painful. Trunk range of motion was full, and PA glides of T10-L5 were pain free. Minimal tenderness to palpation was noted in the paraspinals. The third treatment consisted of paraspinal circles to the lower thoracic and lumbar paraspinals for pain relief. The patient's home exercise program was advanced to include pelvic tilts with marching in supine, and quadruped opposite arm and leg lifts. She was instructed to perform these along with the previous stabilization exercises two times per day with ten repetitions. The patient was

able to perform these exercises correctly with minimal verbal or manual cues. She was also instructed to continue with the daily stretching exercises.

On the fourth visit, the patient had experienced an increase in pain over the last few days. She had attempted to participate in physical training that the army requires, but she was unable to carry a 25 pound rucksack due to the LBP. She rated the pain on this visit as a 5/10, with 3/10 at best over the last three days. Upon examination, her trunk range of motion was still full. Tenderness to palpation was noted in the left lower thoracic and lumbar paraspinals. I was unable to palpate iliopsoas due to her increased abdominal girth, but the Thomas test was positive for iliopsoas tightness bilaterally. The treatment consisted of iliopsoas stretching with the contract-relax technique in prone. Three repetitions were performed bilaterally with a 30 second hold. Grade II PA glides were performed to T10- L5 for pain relief. The home exercise program was altered to include the iliopsoas stretch. This was to be performed along with the DKTC, lumbar rotation, and gas pedal stretch. The stabilization exercises were advanced to include the bridging exercise, and the patient required verbal and manual cues to maintain a neutral spine with this exercise. The bridging exercise was to be performed along with the other stabilization exercises that had been previously prescribed. The patient was also thoroughly educated on the importance of weight loss to reduce the risk of further injury to her back.

The patient reported that she was pain free on the fifth visit. She stated that she had been pain free for the past three days, and that she was able to perform work duties and ADL's without discomfort. Upon examination, she had full range of motion in her trunk. Moderate tightness was still noted in the iliopsoas bilaterally with the Thomas test. The patient's

stabilization exercises were advanced to include the swimmer exercise, bridging with knee extension, and bridging with opposite arm and leg lift. The swimmer exercise is performed in prone by simultaneously lifting the opposite arm and leg. These exercises were to be performed in addition to the exercises previously prescribed. The patient was able to tolerate these exercises without complaints, and she did not require verbal or manual cues to perform them correctly.

On the sixth visit the patient was still pain free, but she occasionally noticed some catching in her low back. She was able to do all ADL's and work activities pain free, including physical training with the army. She reported that she had not been compliant with the exercises over the past week as she had been busy with work. Re-examination demonstrated full, pain free lumbar range of motion, with the complaint of an occasional catch still in the low back. Lower extremity strength was 5/5 bilaterally, and the patient did not exhibit tenderness to palpation of the paraspinals. Since the patient had been pain free for over a week, she was insistent that I discharge her from physical therapy. She had a very busy work schedule, and it was difficult for her to attend the physical therapy appointments. I would have liked her to continue with therapy for a few more weeks, but she was unable to due to her work schedule. We then reviewed her home exercise program of the DKTC stretch, iliopsoas stretch, lumbar rotation stretch, and gas pedal stretch. The stabilization exercises of abdominal hollowing, abdominal bracing, cat/camel, pelvic tilts with marching, bridging, the swimmer exercise, and quadruped opposite arm and leg lift were also reviewed. The exercises were then advanced to include forward and diagonal curl-ups. The patient was thoroughly educated on the importance of doing her exercises on a daily basis to avoid re-injury to her back, and handouts were provided with pictures of all of the

exercises. The patient was able to demonstrate the exercises correctly, and maintain an abdominal contraction and neutral pelvis throughout the motions. The patient was instructed to call with any questions or concerns as she was discharged on this day.

OUTCOMES AT DISCHARGE

The patient was able to meet most of the goals that were established during her physical therapy treatments as she was able to perform her work duties and activities of daily living pain free. Her abdominal strength was not measured at the time of discharge, but she was able to maintain a neutral pelvis with the stabilization exercises. She also demonstrated full, pain free range of motion. The patient also did not exhibit any tenderness to palpation in the lower thoracic or lumbar paraspinals when discharged. Over the course of the six treatments, this patient consistently noticed a decrease in pain except for the fourth visit. Three days before this particular visit she had participated in physical training for the army, which consisted of marching with a 25 pound rucksack. This pain can most likely be attributed to the marching and heavy lifting. Following the fourth visit she again experienced a decrease in pain to the point that she was pain free by the fifth and sixth visits. The patient responded well to the interventions that were given. She was able to understand and demonstrate the exercises correctly with respect to maintaining a neutral spine with the stabilization exercises. She was able to perform the exercises properly without verbal or manual cues at discharge. As far as adherence was concerned, this patient did not adhere as well as she should have. She was instructed to perform her exercises daily, and she became negligent towards the end of her program. In order to gain maximum benefit from the stabilization program, the exercises must continue even after the pain has diminished. Extensive education was provided to the patient

regarding her diagnosis and preventing re-injury to the back, which included the importance of continuing with the HEP. The patient seemed extremely pleased with her physical therapy treatment sessions, and was grateful that she was able to perform her job duties and serve her country without limitations.

Fortunately, the patient was free of any functional limitations and disabilities at discharge. As mentioned earlier, she was able to perform all of her work duties and activities of daily living without difficulty. At the initial evaluation she was unable to exercise or tolerate prolonged positions, and by the end of her therapy sessions she was able to perform these activities painfree. She was also able to participate in rigorous activity with the army that included road marching and field training. The impairments of decreased ROM, muscle spasms, and pain had diminished by discharge. Abdominal strength was not re-measured at discharge, but she was able to maintain a neutral spine without cues during the stabilization exercises. A clinimetric scale was not used for this particular patient, but the functional rating index is commonly used to assess LBP.[31] The Functional Rating Index combines the concepts of the Oswestry and the Neck Disability Index. The test consists of 10 items with five possible responses to each item that represent graduating degrees of disability. The test is easy to administer, and it quantifies the patient's current state of pain and dysfunction for spinal conditions.

CHAPTER 3

DISCUSSION/REFLECTION

This case report describes the effects of a lumbar stabilization program on acute LBP. A positive PIT [4,8] and a "catch"[21] during AROM are both indications for a lumbar stabilization program. Since the patient demonstrated both of these positive tests, a stabilization program was prescribed. The stabilization program emphasized strengthening of the mutifidus, erector spinae, transversus abdominus, rectus abdominus, and internal and external obliques as these are the muscles that contribute to spinal stability.[7] Hides et al[13] found that optimal functioning of the spinal stabilizing system is necessary to control and protect the spine following injury. Others studies have found that patients with acute LBP often have muscle wasting, specifically of the multifidus.[32] This wasting may be due to the consequences of pain and/or reflex inhibition of the muscle due to pain. In one study, recovery of the multifidus was facilitated with specific stabilization exercises that rehabilitated the multifidus in co-contraction with the transversus abdominus.[33] This particular patient was seen for a total of five weeks, and she was pain free by the end of the program. She performed exercises that incorporated all of the stabilization muscles including the multifidus and transversus abdominus, which may have attributed to her positive outcome. It is difficult to determine if these positive results are due to the stabilization program, or if they are due to the fact that most LBP resolves spontaneously.[34] It is important to look at the long-term effects of stabilization exercises on acute LBP. Studies have found that stabilization exercises are effective in improving functional outcomes in patients with chronic LBP, but research is lacking on patients with acute LBP.[35] Hides et al[13] found that subjects who received stabilization exercises that targeted the mulfitidus were 12 times less likely to

experience recurrence of low back pain in the year after the initial episode compared to the control group that did not receive stabilization exercises. It was also found that the control group was nine times more likely to experience recurrence in 2-3 years following the initial episode. Therefore, it is important for these patients to receive early intervention as recurrence rates are often as high as 60-85% in the first year for patients that do not receive stabilization exercises.[2] Even though acute LBP often resolves spontaneously, more research needs to be performed to look at the long term effects of a spinal stabilization intervention.[34]

One limitation of this particular study is the small sample size. In future studies a larger sample size of the general population needs to be examined in order to make an accurate assessment. Also, electromyography testing was not performed to precisely evaluate the muscle recruitment with the stabilization exercises. Ideally, this is necessary so that the examiner can determine if the subject is recruiting the muscles correctly. Another limitation of the study is the fact that a long-term follow-up was not conducted. It would have been valuable to schedule a one-year follow-up along with another at 2-3 years to measure the recurrence rates.

The results from this study concluded that an individual demonstrated a reduction in acute low back pain with a five week lumbar stabilization treatment program. The program targeted several different stabilization muscles in order to decrease the instability of the lumbar spine. Further research is warranted to examine the long-term effects that a lumbar stabilization program has on both acute and chronic LBP.

If I was to see a similar patient in my clinic in the future, a few minor changes would be made regarding the examination, intervention, and plan of care. The questions that were asked in the history would remain the same for the most part, and the examination procedure would be similar as well. The evaluation of this particular patient was thorough and comprehensive, which allowed for an accurate diagnosis to be made. In the future I would use a clinimetric scale to measure a patient's state of pain and level of dysfunction. This would help quantify a patient's functional outcome and validate the results of the physical therapy intervention. The plan of care would entail a few small changes as well. I would have given this patient restrictions on her work duties that included refraining from physical training with the army until she was healed. Physical therapists have the opportunity to provide patients in the military with a "profile", which restricts them from certain duties until the therapist feels appropriate. This patient participated in physical training during her physical therapy treatment, which could have been detrimental to her progress. I also would have scheduled this patient with a follow-up appointment in one to two months following her discharge. This appointment would have been a "maintenance" check up to ensure that she was still pain free and continuing with her stabilization program. Since this patient was slightly overweight I would have liked to have referred her to a dietician or nutritionist. She was exercising on a regular basis, but her diet was not a topic that we discussed during her therapy sessions. I believe she would have benefited from education in this area.

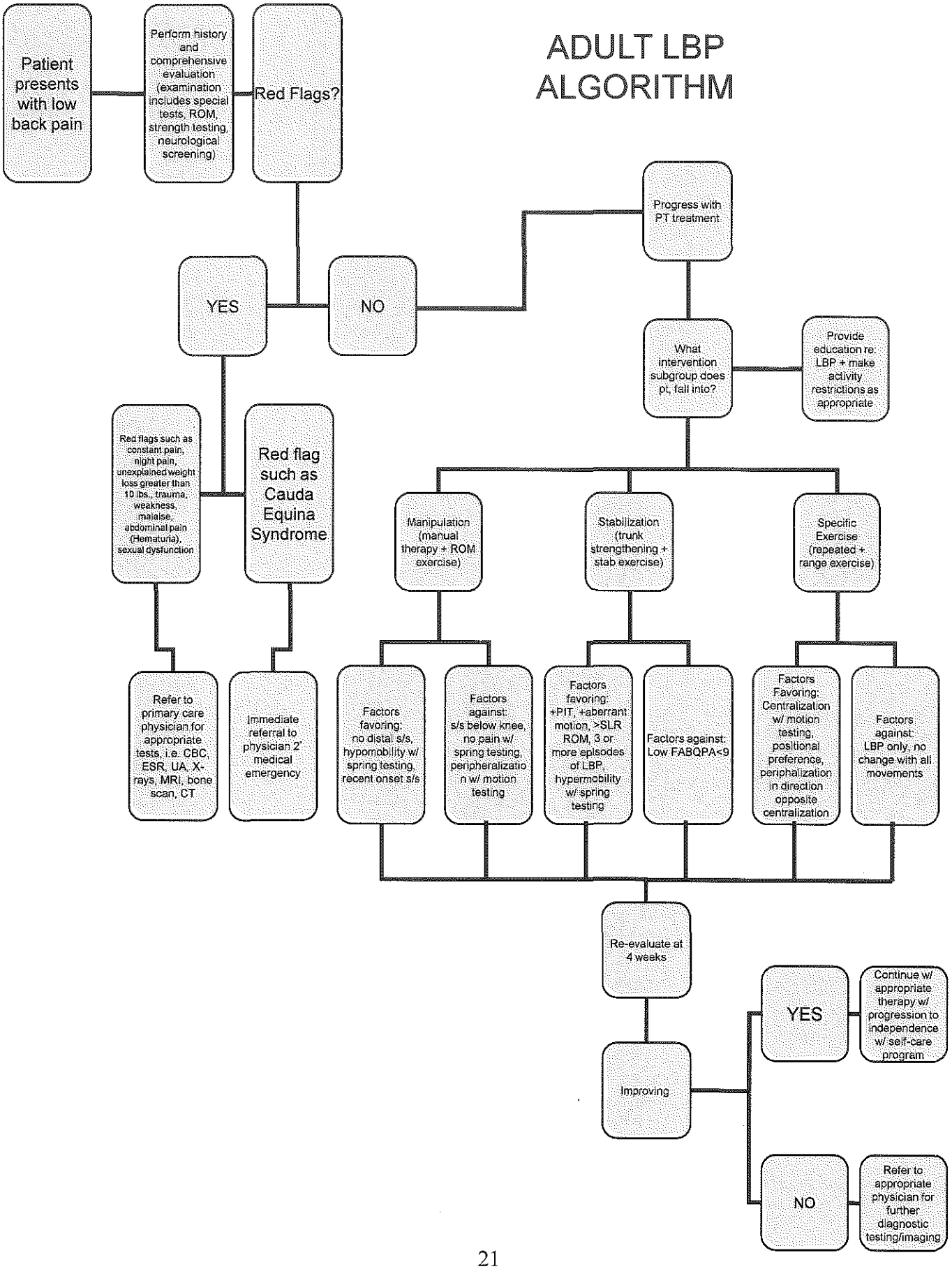
Since this patient was in the military, the physical therapy treatment was free of charge for her. Fortunately, this patient made a full recovery and was able to perform her work duties without difficulty. The military spends hundreds of thousands to millions of dollars training

their soldiers, and a large financial loss may have been sustained if she was unable to continue her work duties in the military. Based on the fact that she was able to return to work without limitations, the physical therapy treatment was a success. If she had been a civilian patient, I do not believe that costs could have been reduced in any way as each treatment session was utilized efficiently and effectively.

Low back pain is a common diagnosis that physical therapists see on a daily basis. Since treating this patient, I have been able to attend several courses that focus on the spine. The military provides extensive training in cervical, thoracic, and lumbar spine issues, and they are proponents of manual therapy and exercise as the primary treatment options. I was recently able to teach an educational back class that focused on stabilization exercises. The class met twice a week for four weeks, and patients with low back pain were referred to the class. Many patients are under the misconception that core strengthening involves primarily the abdominal muscles. It is important for patients to understand the musculature that is involved in core strengthening and the correct way to perform the indicated exercises. I have seen a large variety of patients with low back pain, and have seen many positive results with stabilization exercises. It is rewarding to observe the favorable outcomes in these patients. I am interested in learning as much as I can in regard to spinal stability, and I look forward to attending continuing education courses in the future. While evidence based practice continues to grow in the field of physical therapy, it is necessary to research these treatment techniques and monitor the outcomes.

APPENDIX A

ADULT LBP ALGORITHM



APPENDIX B

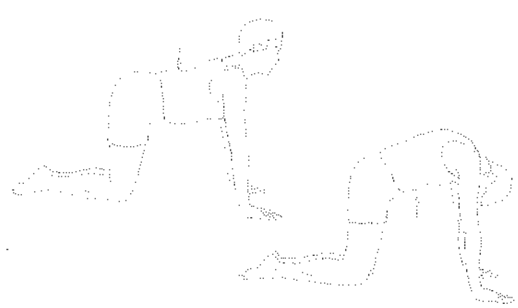
LOWER BACK - 2 [illegible]

Bring both knees to chest and hold. [illegible]

LOWER BACK - [illegible]

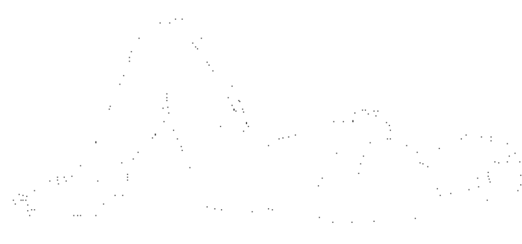
Keeping back flat and feet together, rotate knees to one side.

LOWER BACK - [illegible] Extension



From starting position, tuck chin and tighten stomach while arching back.

LOWER BACK - [illegible]

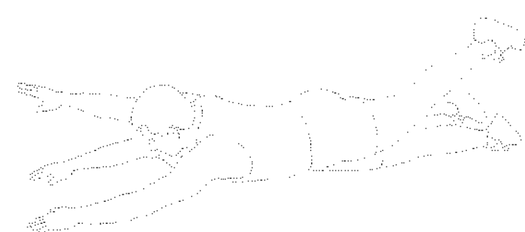


Tighten abdominal muscles [illegible]

TRUNK STABILITY - [illegible] Leg Lift [illegible]

Tighten stomach and slowly raise right leg 6 inches from floor. Keep trunk rigid. Then lower and lift left leg.

BACK [illegible] Arm/Leg [illegible] Alternating



Arms and legs as straight as possible, raise opposite arm and leg. Alternate sides.

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