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# Determining the Need for Program Development for Women in Their Childbearing Years

Christel Parvey  
*University of North Dakota*

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DETERMINING THE NEED FOR PROGRAM DEVELOPMENT FOR WOMEN IN  
THEIR CHILDBEARING YEARS

by

Christel Parvey  
Bachelor of Science in Physical Therapy  
University of North Dakota, 2000

An Independent Study

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

Master of Physical Therapy

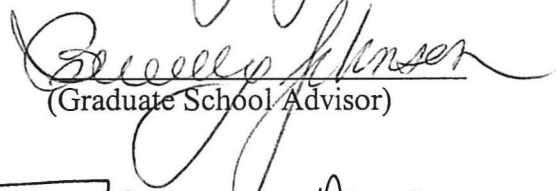
Grand Forks, North Dakota


May  
2001



This Independent Study, submitted by Christel L. Parvey is partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved

  
(Faculty Preceptor)

  
(Graduate School Advisor)

  
(Chairperson, Physical Therapy)

PERMISSION

Title                    Determining the Need for Program Development for Women in  
                                 Their Childbearing Years

Department            Physical Therapy

Degree                   Master of Physical Therapy

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## ABSTRACT

The childbearing year for a woman is a time of physical change and adaptation that can potentially result in a variety of musculoskeletal problems. Acting as a clinician, educator, or consultant, physical therapists can offer a variety of services that would benefit women in their childbearing years. Despite the skilled services physical therapists have to offer, this population continues to display prevalent problems. As a result of these existing problems, a survey was constructed to provide direction for program development to promote the health and wellness of women in their childbearing years. The purpose of this study was to develop an understanding of what interventions are currently offered in the Devils Lake and Grand Forks, North Dakota communities to pre and postpartum women and compare it to an ideal treatment protocol addressing pelvic floor muscles, abdominals, posture, scar mobilization, and the cardiovascular system.

A survey was provided to women at their six week postpartum physician appointment. Criteria included women over the age of 18, and the survey completed within six months of delivery.

Our results consisted of descriptive statistics from the 58 women studied. The most significant problems reported throughout pregnancy were low back pain and stress urinary incontinence (SUI). Sixty one percent of women experienced SUI following an episiotomy, while only 4.3% of these women sought treatment. This common trend, high number of problems experienced with minimal treatment sought, was found throughout

the survey. Other findings in the survey showed that walking was the preferred mode of exercise, and medical doctors and reading materials were most readily used resources.

The childbearing year is a time when the woman is susceptible to injury, and thus a time when dysfunctions could be prevented. Despite the available resources regarding this population, there is a gap in vital information concerning the health and wellness of this population. Through this survey, insight was gained on what issues women are educated on, prevalence of musculoskeletal dysfunctions, and also if treatment was sought. This study has shown the need for physical therapists specializing in women's health to get involved in programming and education of health care providers and women.

## CHAPTER I

### INTRODUCTION

Traditionally, few American physical therapists have been active in obstetric and gynecological care despite the prevalence of musculoskeletal problems associated with childbirth. This lack of involvement, according to Noble, is a key issue because it leaves "significant deficiencies in early prenatal education, which would emphasize the role of body mechanics, postural, and other physical adjustments throughout the childbearing year."<sup>1</sup> Because this population has been overlooked for years, alarming statistics exist supporting Noble's statement including a study by Ostgaard and Andersson.<sup>2</sup> They found low back pain continued to be a problem in 37% of women 18 months following childbirth. Another study reported diastasis recti abdominis occurred as often as 67% during pregnancy and at a rate of 36% in a later postpartum group.<sup>3</sup> A third study found 39% of a sample experienced stress urinary incontinence either before, during, or after pregnancy.<sup>4</sup> It was calculated that the United States spent 11.2 billion dollars annually managing incontinence, excluding nursing home residents.<sup>5</sup> Acting as a clinician, educator, or consultant, physical therapists can offer a variety of services to benefit these overlooked women and are now able to treat numerous complaints previously considered untreatable.

#### **Problem Statement**

Despite all of the research available to expecting mothers, there are still many misconceptions regarding adaptations a women's body must make in order to accomplish

a successful birthing process and recovery. Sadly, many women do not seek treatment for problems when they arise because they assume the changes are a normal, untreatable part of the childbearing process or the issues may be too embarrassing to address. Unfortunately, what these women, and some health care providers do not understand is that by doing a few simple exercises regularly and correctly, the majority of these dysfunctions can be treated and may even be prevented.

Ironically, it is not uncommon for a mother to go to great lengths to ensure the safety and well being of her growing child, but fail to tune in to the needs of her own body. With the demands of work and duties of being a mom, women find little time to prepare and recover properly from childbirth. Some women try to take an active role in their pregnancy because of society's emphasis on the health and well being of a mother and her growing fetus. However, they do not focus on the potential problem areas like the pelvic floor, where changes in these muscles may progressively get worse if not treated promptly and properly. Research shows that up to 80% of women suffer pelvic floor muscle damage during their first vaginal delivery.<sup>6</sup> The American Physical Therapy Association (APTA) Gynecological Manual states, "Though many conditions present clinically later in life, the basis can often be traced back to an obstetric event whose effect has been compounded by further parity and age." This is very alarming to think that ten, even twenty years later a women can still suffer adverse effects of ignored problems resulting from past pregnancies.

### **Purpose of Study**

The purpose of this study is to develop an understanding of what interventions are currently offered, in the Devils Lake and Grand Forks, North Dakota communities, to pre

and postpartum women and compare it to an ideal treatment protocol addressing pelvic floor muscles, abdominals, posture, scar mobilization, and the cardiovascular system. The study was accomplished through a survey and may provide direction for program development to benefit the health and wellness of women in their childbearing years.

### **Significance of Study**

Part of the reason for this lack of awareness is the inadequate knowledge and services available to meet the needs of today's expectant mothers. This survey will help clarify what information mothers are getting during their childbearing years and from where/whom they are receiving this knowledge. After surveying these women, we have better insight regarding issues women are educated on, the prevalence of musculoskeletal dysfunctions, and also if treatment was sought.

Physical therapists and other health care providers can get involved in program development to expand services and information women in their childbearing years receive. It is imperative that services provided to these women be explored in order to prevent future problems women may continue to experience later in life secondary to childbirth. Physical therapists have a knowledge base to treat this clientele and the problems will continue to exist if they are not addressed or treated.

### **Research Questions**

What is the prevalence of musculoskeletal dysfunctions? What is the extent of education of women and health care providers in the investigated communities? Do prenatal programs or health care providers offer education or advise treatment for: 1) Pelvic floor 2) abdominals 3) posture 4) scar management 5) aerobic exercise? Where are

the women receiving their information? What are the women doing for exercise during and after pregnancy?

### **Hypothesis**

The null hypothesis states that there is adequate information and well-established pre and postpartum programs. While the alternate hypothesis determines there is a need for guidelines for a complete and comprehensive pre and postpartum protocol and implementation of these services.

## CHAPTER II

### PELVIC FLOOR

#### Anatomy and Function

The muscles in the perineum are divided into a deep and superficial layer. The deepest layer of striated muscles form the pelvic floor diaphragm and include the coccygeous and levator ani muscles: pubococcygeus, puborectalis, and iliococcygeus.<sup>7,8,9</sup> Wallace also includes the pubovainalis muscle as part of the levator ani.<sup>10</sup> Together, the muscles resemble a hammock slung from the anterior pubis to posterior sacrococcygeal area.<sup>7,8</sup> Toned pelvic floor muscles are necessary to support the uterus and pelvic contents.<sup>9</sup> These muscles must already work against gravity to maintain this duty, and the extra weight of the uterus in pregnancy may cause the hammock to sag.

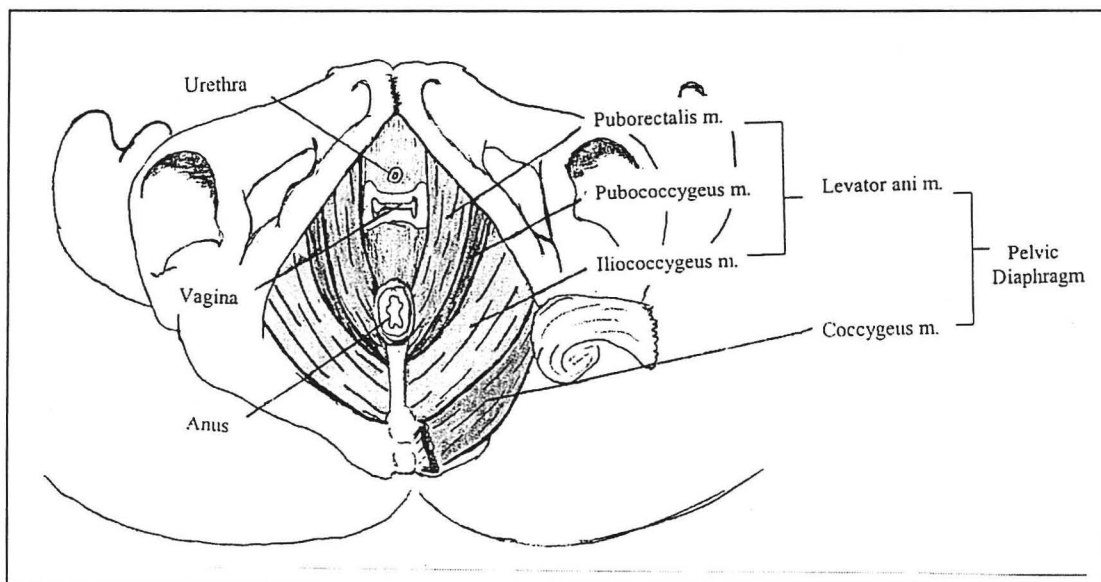


Figure 1. Levator ani and coccygeus muscles of the pelvic diaphragm.

Awareness of these muscles may benefit women during labor allowing the muscles to relax and assist with delivery.<sup>1,9</sup> The women now can assist in delivery by releasing the muscles instead of tightening them, which may even avoid an episiotomy.<sup>9</sup> An episiotomy is defined as an incision of the perineum made at the end of labor that can extend into the pelvic floor muscles.<sup>9</sup>

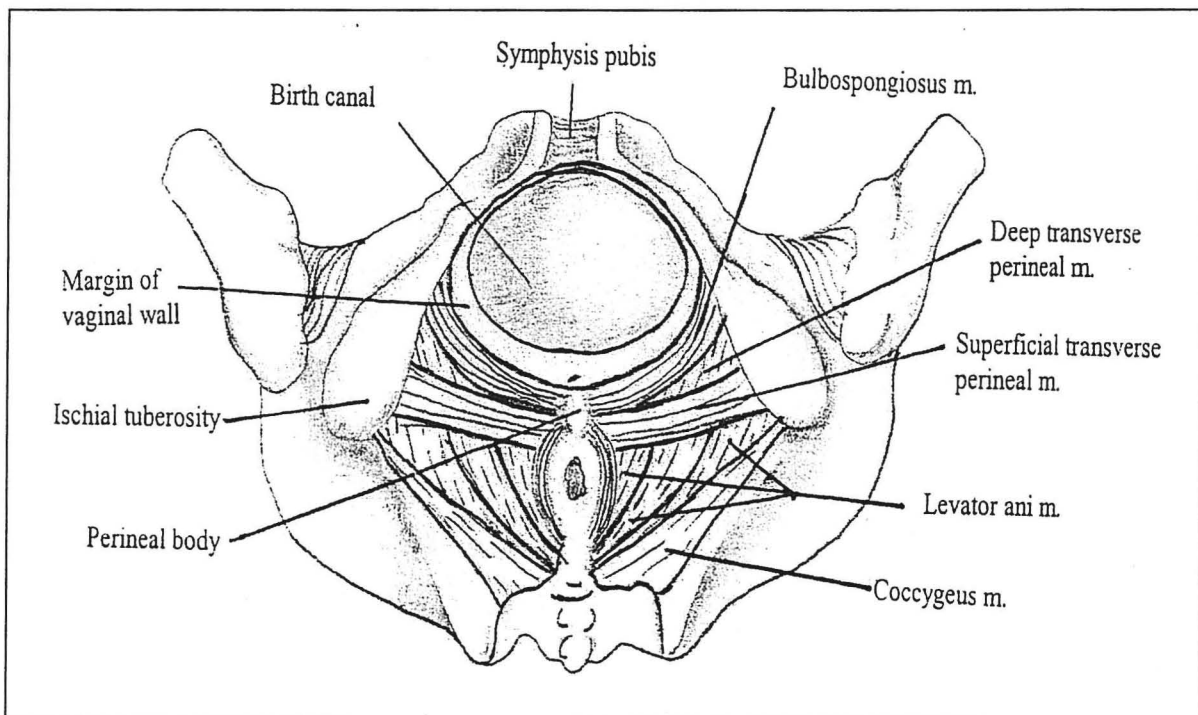


Figure 2. Deep and superficial perineal muscles.

The superficial muscles also have a vital function in the perineal region. The urogenital triangle is made up of more superficial muscles that primarily assist with sexual function and urethral sphincter action.<sup>7,10</sup> The superficial muscles insert in close proximity to the clitoris affecting blood flow to this area thus possibly enhancing sexual satisfaction.



The pelvic floor also plays an integral role to counteract the increases in intraabdominal pressure maintaining continence. The proximal urethra is closed to counteract the increase in abdominal pressure during activities such as coughing or sneezing. Urethral closure is assured by a strong pelvic floor muscle contraction otherwise leading to inadequate urine control. The outermost layer of the anal triangle is made up of the anus and external sphincters, which maintains the anorectal angle contributing to faecal continence and provides rectal support during defaecation.<sup>8</sup>

### **Effects of Pregnancy**

Pelvic floor muscles become stretched secondary to stresses of pregnancy including weight gain.<sup>1</sup> Soft tissue laxity is also responsible for the adverse effects of pregnancy on the pelvic floor muscles. Increases in hormones soften the smooth muscle of the urethra and fascia, surrounding ligaments, and joints. This laxity then contributes to pelvic floor weakness.<sup>8</sup> Subsequently, childbirth and pregnancy are the most common causes of pelvic floor laxity.<sup>1</sup> However, other sources of stress have been identified including estrogen deficiency or menopause, obesity, chronic coughing, chronic constipation, or improper lifting with breath holding.<sup>11</sup> Finally, the pudendal and pelvic nerves may become partially denervated by traction or entrapment during delivery leading to laxity of perineal muscles and sphincters.<sup>9</sup> Without proper exercise, stretched pelvic floor muscles become even weaker and are unable to optimally perform the vital functions of support, sphincter control, sexual response, and aid baby's head to slide out during childbirth.<sup>1</sup>

## Potential Problems

Pregnancy and delivery are responsible for many of the dysfunctions seen in females including incontinence, prolapse, hypertonus, pain, and incoordination of the pelvic floor muscles.<sup>11</sup> With sagging pelvic floor muscles, the mother will not be able to support bowel and bladder control.<sup>12</sup> One problem she may face is stress urinary incontinence (SUI) an “involuntary loss of urine following an abrupt increase in intraabdominal pressure (such as sneezing, coughing, or jumping)”.<sup>11</sup> Vaginal births may cause a significant decline in pelvic muscle strength, which in turn results in a higher susceptibility to SUI.<sup>12</sup> A pelvic floor program can strengthen these muscles, and the mother can gain control of her bladder function.

Fecal incontinence is another dysfunction associated with pregnancy and childbirth affecting 11% of females.<sup>13</sup> It is possible that the pudendal nerve will become damaged during the episiotomy or from tearing with vaginal delivery. If either of the pudendal nerves is not intact following sphincter repair, normal fecal continence will fail to exist.<sup>9</sup> Therapists must acknowledge that pelvic floor damage from childbirth (tearing) or possibly episiotomies may cause this significant dysfunction.

Trauma to the coccyx or pelvis during childbirth can create another condition called pelvic floor muscle hypertonus. Spasms may result in response to joint or ligament injury/malalignment.<sup>14</sup> This leads to abnormal use of the pelvic floor muscles. A woman may learn to maintain this dysfunction through a constant state of contraction because of fear of falling out (prolapse) or bladder leakage.<sup>6</sup> Conversely, the stretched muscles may not be able to coordinate movements and allow dysfunctions such as prolapse to exist because of inadequate support of the internal organs such as the bladder

and rectum. Pelvic pain caused by hypertonus of the stretched or deformed muscles may cause the development of painful trigger points. Consequently, a woman may experience painful intercourse, and the stretched muscles will decrease the sexual response.<sup>1</sup>

### **Prevention**

Patient education is the key to eliminating or decreasing any dysfunctions that may develop secondary to pregnancy. A key element is strength of the pelvic floor musculature. A leading exercise program in pelvic floor strengthening is the kegel exercises, firing of the pelvic floor muscles. They were described by Dr. Arnold Kegel and have been used since the late 1940's to treat incontinence and strengthen the pelvic floor.<sup>15</sup> The exercises should be performed in the early stages of pregnancy to accommodate for the physical changes of pregnancy, and they should be recommended during the early stages of pregnancy and immediately following childbirth to help prevent future dysfunction and muscle wasting. Suturing will aid in restoring structure of the pelvic floor; however, it will not assist in the return of pelvic floor muscle function.<sup>1</sup> In order to regain optimal function, the pelvic floor muscles must be actively contracted.

Education is crucial. Miller et al<sup>16</sup> estimated that 30-50% of women perform pelvic floor exercises incorrectly. Many women simply need assistance to identify the correct muscle action and then integrate it with exhalation. Once this is accomplished, the woman can perform and progress through the exercise sequence at home with the aid of a home exercise program.

Noble,<sup>1</sup> among many other authors, have expanded the simple exercise to include various versions of the primary pelvic floor exercise. Contract, Hold, and Relax can be correctly performed in supine. Instructions are given to draw the pelvic floor muscles up

and tighten the muscles surrounding the vagina and urethra. Hold for 2-10 seconds and then release the muscles. Quick flicks are utilized when anticipating a sneeze. The maximum number of contractions that need to be performed in one sitting is ten. Alternating between slow squeezes and quick flicks is necessary to allow adequate rest between these two exercises. Sexercises can be performed with a partner for additional strengthening benefits and feedback. Finally, women can think of the pelvic floor as an elevator moving from level to level lifting the muscles up and down the floors. Specific descriptions of these exercises have also been provided in Appendix B.

The training principles for this set of muscles are identical to any other group of muscles in the body.<sup>11</sup> First, in order to prevent substitutions, a submaximal contraction will help correctly fire the appropriate muscles. Second, the muscles must be overloaded by increasing the frequency first and then the duration of exercises. Third, the patient should begin the exercises in the gravity-eliminated position of supine and progress to a more functional position of standing and walking. Finally, a hold relax ratio of 1:2 is used to avoid muscle fatigue in weak muscles. If one is able to perform these exercises in antigravity positions of standing or sitting, then a ratio of 1:1 can be utilized; remembering that relaxation is as important as the contraction.<sup>11</sup> Common errors that must be avoided while performing the exercises include holding breathe while bearing down and crossing the legs. Lastly one should identify and isolate the pelvic floor muscles before trying to incorporate abdominals and buttocks with the pelvic floor exercises to ensure correct performance.<sup>1</sup>

## **Treatment of Stress Urinary Incontinence**

The most common self-assessment tool used is the functional stop urine test. Sources vary on whether to perform this test weekly versus monthly; however, it is understood that this test may disrupt the normal autonomic voiding reflex and should only be used as an evaluation technique.<sup>1,8,9,11</sup> The patient is instructed to stop the flow of urine and assess the amount of urine deflected.<sup>1,11</sup> A patient's strength and progress can be documented by providing the muscle grade. A fair grade is the "ability to stop the flow of urine in a gravity-resisted position; however, incontinence may occur as a result of increased intraabdominal pressure." This makes the fair grade different from a normal or good grade. With a poor grade, the client is able to deflect or reduce the stream of urine while a trace is the inability to maintain this change. If the patient is unable to stop the urine flow the client is given a zero grade.<sup>11</sup>

A trained therapist specializing in women's health techniques should perform a complete subjective and physical examination. A variety of treatment methods can be utilized depending on the diagnosis. For genuine stress urinary incontinence, techniques such as biofeedback are utilized to identify the correct musculature. Kegel observed that approximately 40% of women cannot identify the correct musculature.<sup>15</sup> Weighted vaginal cones may be utilized for treatment providing sensory feedback to the patient.<sup>11</sup> This is a highly specialized field and a therapist should have training prior to treating a patient with this complicated dysfunction.

## **Treatment of Fecal Incontinence**

Physical therapists have the knowledge of factors that may be contributing to fecal incontinence, such as the inability to stabilize the pelvis, poor posture, and tight

fascia.<sup>8</sup> Instruction in strengthening and enhancing function in reinnervated muscles are essential skills that allow therapists to treat patients who suffer from fecal incontinence. Therapists can encourage a sitting or squatting position where the patient's hips and knees are fully flexed promoting efficient defecation. A specialized health care provider should address this significant dysfunction.

### **Treatment of Hypertonus**

Various physical therapy techniques can be utilized to treat the painful condition of hypertonus, which should only be initiated following a complete medical screening and therapy evaluation.<sup>11</sup> This should be done to rule out psychogenic, visceral, iatrogenic, and neurological factors that may be the source of origin. However, if the evaluation concludes that the hypertonus is secondary to muscle dysfunction then manual therapy, myofascial release, posture education, and a directed exercise program of strengthening and/or lengthening exercises of affected pelvic and trunk muscles can be utilized. General relaxation training is also recommended through biofeedback, imagery, and thermal relaxation for example.

## **ABDOMINALS**

### **Anatomy and Function**

The abdominal muscles are divided in two groups, posterior and anterior. The posterior group is made up of the quadratus lumborum and multifidus muscles.<sup>8,9</sup> Anteriorly, the rectus abdominis extends between the rib cage and the pubic symphysis along with the anterolateral group consisting of three layers of muscles: external obliques, internal obliques, and transversus abdominis. These muscles meet in the midline with the right and left halves separated by a band of collagen called the linea

alba. Above the umbilicus, this structure is naturally 1-2 cm wide and becomes narrower as it descends below the umbilicus.<sup>8</sup> The anterior and posterior abdominals function together to support the spine as well as the internal organs.<sup>17</sup> The internal and external obliques plus the transversus abdominis are the prime muscles in trunk stability.<sup>18,19</sup> Bergmark proposed the inclusion of the quadratus lumborum as a stabilizer for the spine.<sup>20</sup>

### **Effects of pregnancy**

Significant physical changes occur with pregnancy, including an average weight gain of 9-12 kilograms.<sup>8,21</sup> During this period of weight gain, the abdominals stretch over the growing uterus. As a consequence, the anterior muscle group is stressed the most.<sup>9</sup> The slack muscles then allow the back to hollow and the pelvis to tilt forward. If a posterior pelvic tilt is not performed to correct this postural defect, a stretched abdominal wall will become weakened and will be less supportive for the spine now or during a subsequent pregnancy.<sup>9</sup> Gilleard<sup>22</sup> found that during and after pregnancy there was a decrease in the abdominals functional ability based on the decreased ability to stabilize the pelvis. He theorized that these inadequacies could lead to muscle imbalances, inefficiency in movement, postural changes, and overall development of low back pain. Some physical therapists have connected this to an increase in lumbar lordosis; however, the literature does not support this.<sup>9</sup>

### **Consequences of Weak Abdominals**

Boissonnault and Kotarinos<sup>23</sup> believe that mechanical stresses along with circulating hormones may lead to the separation of the linea alba. The softening of connective tissue from an increase in hormones could result in an unstable insertion and

inefficiency of the muscles. Therefore, these muscles will not be able to perform at optimal functional capability to stabilize the pelvis.<sup>8</sup> One may be unaware that they have the condition called diastasis recti, the separation of the recti muscles, which may occur under stress during pregnancy as shown in Figure 3. Other predisposing factors for diastasis recti include obesity, multiple pregnancies, a large baby, or excess fluid in the uterus. The separation is normal to a certain extent, but may require attention in order to heal following childbirth. The linea alba that runs between the two rectus muscles may gradually separate painlessly and without bleeding. Although this condition is painless, a chronic backache can indicate a need to check the level of separation and begin treatment.<sup>8</sup>

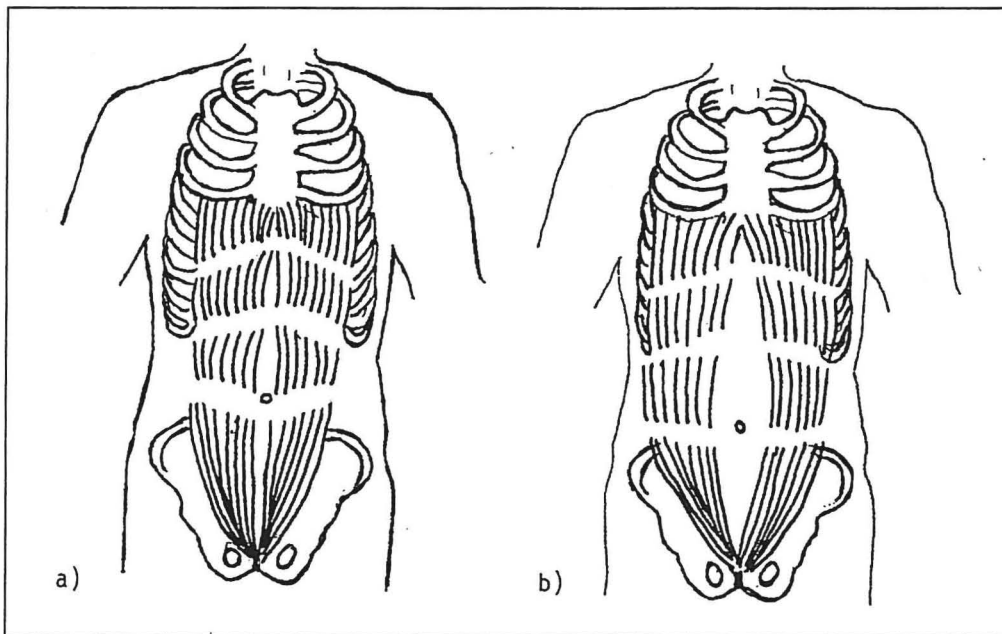


Figure 3. Rectus abdominis muscles a) normal b) diastasis recti.

Slack abdominal muscles will not be able to maintain a neutral pelvis, and poor posture, muscle strain, and backaches are an inevitable result.<sup>1</sup> A weakened abdominal wall is also associated with urinary incontinence. Diastasis recti abdominis leads to



stretch weakness and an inability of the abdominal wall to support the pelvic organs. The wall loses rigidity and allows the contents to add further stress to the pelvic floor muscles, already weakened by pregnancy.<sup>17</sup> Abdominal muscle contractions must be complimentary to pelvic floor contractions. One must consciously breath while performing these tummy tucks to work with the pelvic floor muscles. A co-contraction of both the abdominals and pelvic floor muscles before and during activities that increase abdominal pressure decreases pelvic floor bulging and urinary leakage. These tummy tucks aid the pelvic floor by pulling the urethra and bladder into the pelvic cavity releasing the stress off of the pelvic floor muscles.<sup>17</sup>

### **Prevention**

A physical therapist may educate mothers prenatally including instructions on appropriate transitional movements.<sup>17</sup> One suggestion is to always roll first to the side and then sit-up from supine. Noble,<sup>1</sup> emphasizes using the arms during transitional movements to avoid placing excessive stress on the softened linea alba. Also double leg raising is a contraindication for the same reason of inadequate support or stress that could lead to injuries or further separation of the abdominal muscles.<sup>1</sup> Instructions such as avoiding valsalva during activities of daily living (ADL's) and the functional use of the abdominals to support the spine with ADL's should be given to these women in the childbearing years. Physical therapists are also responsible for showing these women how to lift without pushing the abdominals out. It is vital to perform a proper abdominal contraction before performing movements that may increase the intraabdominal pressure to prevent enlargement of the diastasis.<sup>17</sup>

Hodges and Richardson,<sup>24</sup> demonstrated that the activation of the transversus abdominis was significantly delayed in patients with chronic low back pain, whereas in normal individuals who are not experiencing back pain, the transversus abdominis was activated before all other abdominal muscles. Therefore, training patients who suffer from back pain to activate this muscle led to lesser recurrent symptoms because the transversus muscle was able to stabilize and anticipate the movement. According to Richardson and Jull<sup>19</sup>, the co activation of the key muscles, the transversus abdominis and multifidus, helps to maintain a neutral spine. Gently drawing in the abdominal muscles focusing on the lower abdominals fires the posterior multifidus simultaneously. Finally a co-contraction of the multifidus and pelvic floor can assist contraction of the transversus abdominis.<sup>19</sup>

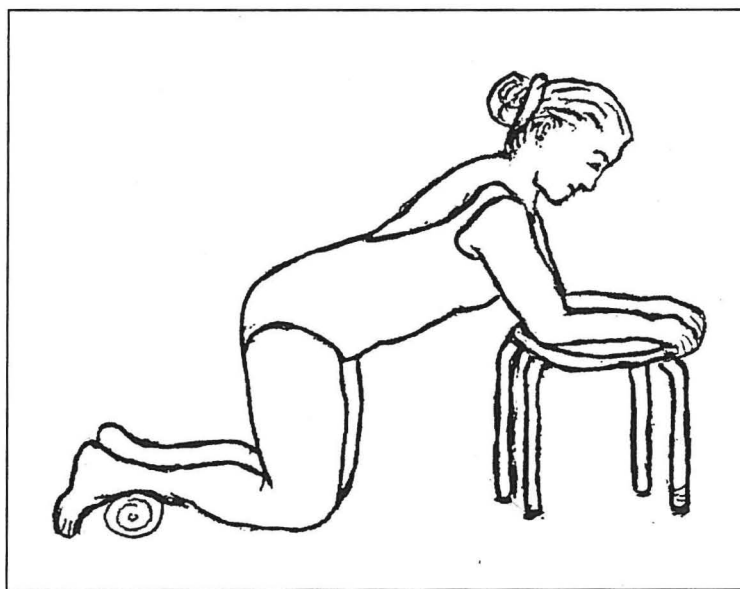


Figure 4. Modified all fours position for transversus exercise.

Richardson and Jull,<sup>19</sup> recommend teaching this exercise in an all fours position, which provides stretch facilitation to the stabilizing muscles.<sup>8</sup> They also encourage the physical therapist to provide facilitative techniques to teach correct activation of the

transversus muscle if the client is unable to produce a therapeutic contraction. Place your hand on the lower abdomen and use the instructions: "breathe in, breathe out, and slowly draw your abdomen away from my hand and toward your spine; now resume breathing." The contraction should be held for 10 seconds. However, postnatally the exercise needs to be taught in a modified all fours kneeling position (Figure 4) until six weeks post partum.<sup>8</sup> This modified position is used to avoid an air emboli until the vaginal and uterine walls have healed.

Isometrics or sucking in of the abdominals are better exercises for beginners since strong exercises (concentric or eccentric) must not be attempted until there is good recovery of the abdominals and pelvic floor muscles. The muscles are no longer taut and stretched over the uterus; therefore, exercises should be started within 24 hours after childbirth. Noble<sup>1</sup> reports this will prevent muscle wasting and aid in return of muscles to their original length.

Stabilization should be the prime consideration when prescribing abdominal exercises.<sup>25</sup> In *Women's Health: A Textbook for Physiotherapists*<sup>8</sup>, the clinician is advised to place an emphasis on utilizing the abdominals to maintain pelvic and lumbar stability by utilizing exercises that challenge abdominal endurance through lower extremity movements. *Rehab Options*<sup>17</sup> describe an exercise in crooklying where the women must stabilize the trunk and pelvis while slowly lowering one leg. The other leg remains in flexion. She suggests to progress to slowly lifting and lowering the extended leg 30 degrees as done in a straight leg raise (SLR). Bridging and lunging are also functional positions to practice this new co-contraction technique.<sup>8</sup>

## Treatment of Diastasis Recti

Being aware of the condition of diastasis recti is the first step a clinician must take. Mothers can be instructed to monitor for abdominal separation (Figure 5). They should lie in supine and then lift their head and shoulders off the bed. One hand with the fingers horizontally will be used to check the amount of separation by placing the fingers immediately above the umbilicus. This should be checked at least once a week prenatally.<sup>17</sup> A separation of one to two fingers indicates a normal gap; however, three or four fingers indicate that a corrective exercise is necessary. Hakeem<sup>17</sup> specifies that above or at the umbilicus two finger widths is normal and below the umbilicus one finger width is normal. If an abnormal separation is present, curl-ups, diagonal lift exercises, and leg lowering will only make the gap larger and must be avoided.<sup>1</sup> Advanced abdominal exercises can be added when the separation has been narrowed to within normal limits.

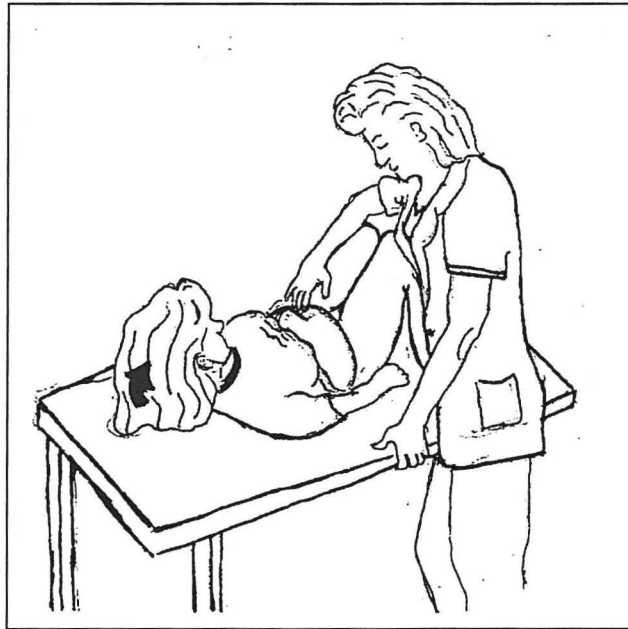


Figure 5. Checking for diastasis recti.

A cross hand technique can be used to correct the separation as shown in Figure 6. Lying in supine with the knees bent, the patient will cross her hands over her abdomen and approximate the belly. As she exhales, she should raise her head off the bed until just before the bulge appears, and at the same time pull the abdominal muscles together. She then holds for a count of five and then slowly lowers her head back down. This should be repeated 10-30 times.<sup>1,17</sup>

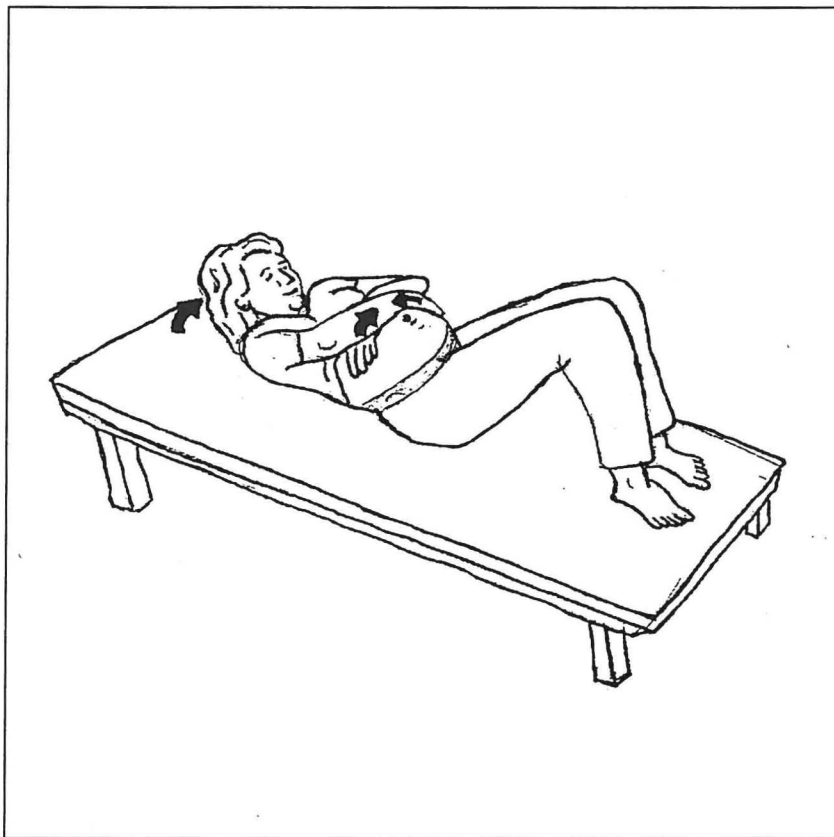


Figure 6. Correction exercises for diastasis recti.

Hakeem<sup>17</sup> also recommends utilizing a binder if the gap is greater than 4 cm. This may act as a reminder to tuck in the tummy and stand up tall. Herman and Shelly<sup>17</sup> recommend lying on a sheet placed between the rib cage and pelvis that crosses over the belly to approximate the muscles when the diastasis is three fingers or greater from two

months before childbirth to two months after childbirth. They also feel the patient should see a Physical Therapist for specific instruction and receive an abdominal binder.

Treatment is necessary to eliminate diastasis recti and to strengthen the abdominals because inadequate support of the abdominals will greatly affect one's ability to support the spine, not to mention the dysfunctions of incontinence already discussed. This will affect the woman's posture and lead to common musculoskeletal complaints in pregnancy.

## **POSTURE**

Good body mechanics and posture with all activities of daily living helps to prevent excess tension or stress on muscles and ligaments that could possibly lead to dysfunction and pain. Ideal posture allows the muscles to be their appropriate length thus allowing adequate strength for prevention of injury and a state of muscle equilibrium. Proper posture would be demonstrated by a plumb line that bisects the ear lobe, acromion process, thorax, greater trochanter, and then falls slightly anterior to the knee joint and the lateral malleolus of the ankle.<sup>1,8</sup> Psychologically, a normal posture in pregnancy can promote a positive body image.<sup>1</sup>

### **Effects of Pregnancy**

When postural adaptations occur, unwanted stresses are added to the joints. Changes in the joint laxity secondary to an increase in hormones such as relaxin will make pregnant women more susceptible to injuries.<sup>8</sup> Relaxin softens ligaments and loosens joints. Soft tissue structures, including muscles are consequently either shortened or lengthened. Common tight or shortened muscles in pregnancy include the scapula protractors, levator scapulae, back extensors, hip flexors, tensor fascia lata, piriformis,

hamstrings, adductors, and gastrocnemius.<sup>9,26</sup> Weak muscles include the scapular retractors, lower lumbar paravertebrals, gluteus maximus and medius, abdominals, and quadriceps muscles.<sup>26</sup> The combination of weak muscles and joint instability leads to the need for strengthening, protection, and prevention.

Authors agree that there is an increase in lumbar lordosis with the extra weight of the growing fetus anteriorly. By the 12<sup>th</sup> week of pregnancy, the enlarging uterus can no longer remain in the true pelvis and moves into the abdominal cavity. As a result, her center of gravity (COG) will now be shifted forward and upward.<sup>9</sup> Theorized postural responses such as increased activation of the gastroc/soleus complex and active posterior displacement of the body exist to accommodate for the postural changes.<sup>8</sup> The literature proposes a variety of these postural changes that occur: 1) increased thoracic kyphosis.<sup>27</sup> 2) increased lumbar lordosis<sup>27,28</sup> 3) anterior displacement of the sacrum<sup>29</sup> 4) posterior displacement of the trunk<sup>30</sup>

### **Potential Problems**

Postural changes can lead to many common musculoskeletal complaints of women during pregnancy. Changes such as increased cervical curve and weight of the breasts allow the head to protrude and shoulder to round leading to neck and upper back strain.<sup>1</sup> A common problem with this dysfunction is trapezius and upper to midcervical muscle spasms.<sup>9</sup> Another condition concerning changes of the head and neck is thoracic outlet syndrome. The physical therapist will need to utilize special tests to evaluate for the site of nerve compression and treat accordingly. Possible sites of compression are at the scalenus anticus, pectoral muscles, or the artery may be trapped between the clavicle and the first rib.<sup>9</sup>

Dumas et al,<sup>31</sup> correlated the severity of low back pain with changes in lordosis. The greater the lordosis “the more likely the person was to suffer severe back pain.” A woman may attempt to compensate for the changes in her COG and her gait may become waddling as she shifts her weight back and relaxes her abdominal muscles.<sup>9,32</sup> Low back pain may develop secondary to change in gait, or this gait may lead to spasms in the piriformis muscles.<sup>9</sup> Physical therapists can educate women on tightening the abdominals and maintaining proper body alignment despite the significant changes in their bodies. Even with this education, many women will suffer from low back pain before and after pregnancy. Fast et al,<sup>33</sup> reported just over 50% of women suffer from low back pain during pregnancy in the United States.

The piriformis muscle may cause back pain if shortened during pregnancy. Spasms in this muscle could lead to radiating pain to the sacrum, hip joint, gluteal region, or posterior upper thigh. The involved buttock will be tender with palpation, and the involved leg may appear shortened and externally rotated. The therapist can treat the piriformis muscle with heat, gentle stretching, and deep pressure at the insertion of this muscle. According to Obstetric and Gynecologic Care in Physical Therapy,<sup>9</sup> this should provide immediate relief. Other methods of intervention include deep friction massage and instruction for self-stretching.

Postural changes are just one of the many reasons for low back pain. Other predisposing factors of low back pain include weight gain during pregnancy, vascular effects, previous back pain experienced during menstruation, back pain in previous pregnancy, and repetitive lifting or bending.<sup>9</sup> The lumbar pain may occur because ligamentous support during pregnancy may be insufficient to support the increased load



allowing the joints to become misaligned. This can be caused from pain of the facet joints, paraspinal muscles, or the supporting ligaments themselves. Treatment should focus on strengthening of spinal stabilizers such as the abdominals and maintaining a neutral pelvis with ADL's as previously discussed.

Other joints that are affected by poor posture and the effects of pregnancy include the sacroiliac (SI), symphysis pubis, and coccyx. The SI joint may rotate anteriorly or posteriorly because of the laxity. Ostgaard<sup>34</sup> differentiates sacroiliac pelvic pain from lumbar back pain because low back strengthening program generally makes this condition worse. Treatment should include local heat, rest, muscle correction, mobilization, and/or a home program to remedy the dysfunction. The patient should avoid widely abducted legs during activities of swimming (frog kicks), climbing stairs (more than one at a time), or swinging one leg out of the bed when getting up which may cause rotation in this joint.

During delivery, the symphysis pubis may also shift with the indicating symptoms of pain in the symphysis pubis region and SI. Upon assessment, the therapist may palpate misaligned bones, which will be tender to touch. Treatment for acute discomfort is cold or heat. An immobilizer binder for the symphysis pubis may be used to maintain joint integrity.<sup>9</sup>

Painful subluxation of the coccyx during delivery may result in scarred tissues over the distal end of this joint. Relief may be achieved by anterior/posterior mobilization of the coccyx or applied heat. A coccyx pillow can be provided for sitting comfort. Thiele<sup>35</sup> describes treating this condition with a massage along the length of the levator ani and coccygeus muscles.

Finally, the knee instability can cause dysfunction at the knee joint or patella.<sup>8</sup> Laxity of the ligaments may lead to strain, and treatment of taping or biofeedback to strengthen the muscles surrounding the knees may be indicated. Gait and balance training may be necessary to assist patient in correct support of the joint.<sup>9</sup>

### **Posture Retraining**

It is vital to instruct the client on postural retraining because without intervention the patient may maintain her new undesirable posture. In a study by Dumas et al,<sup>31</sup> postnatal postures were not significantly different from measurements taken during pregnancy. They concluded that these changes would not be spontaneously corrected. A goal of postural education includes increasing the ability of the trunk muscles to co-activate in order to support the spine with a pelvic tilt. A therapist can progress the client by challenging her base of support (BOS). One way to challenge her BOS would be to have the women lift an upper extremity and the opposite lower extremity focusing on correct posture in an all fours position.

In order to improve posture, women should be made aware of their postural deviations as done in Figure 7. Corrections can be made through the use of manual facilitation, verbal feedback, or with a mirror. A neutral pelvis is the key to determining ideal posture. The pelvis, upper low back, and head need to be controlled with exercises such as the posture check, pelvic tilt, and chest stretch. Instructions to find neutral pelvis are to be provided and demonstrated to the client. Directions to the client may include: "Tuck the chin and think tall as if an invisible string were pulling your head toward the ceiling."<sup>1</sup> Finally, the therapist will need to address shortening of muscles with a

stretching and strengthening program. This should include proper warm up and cool down.

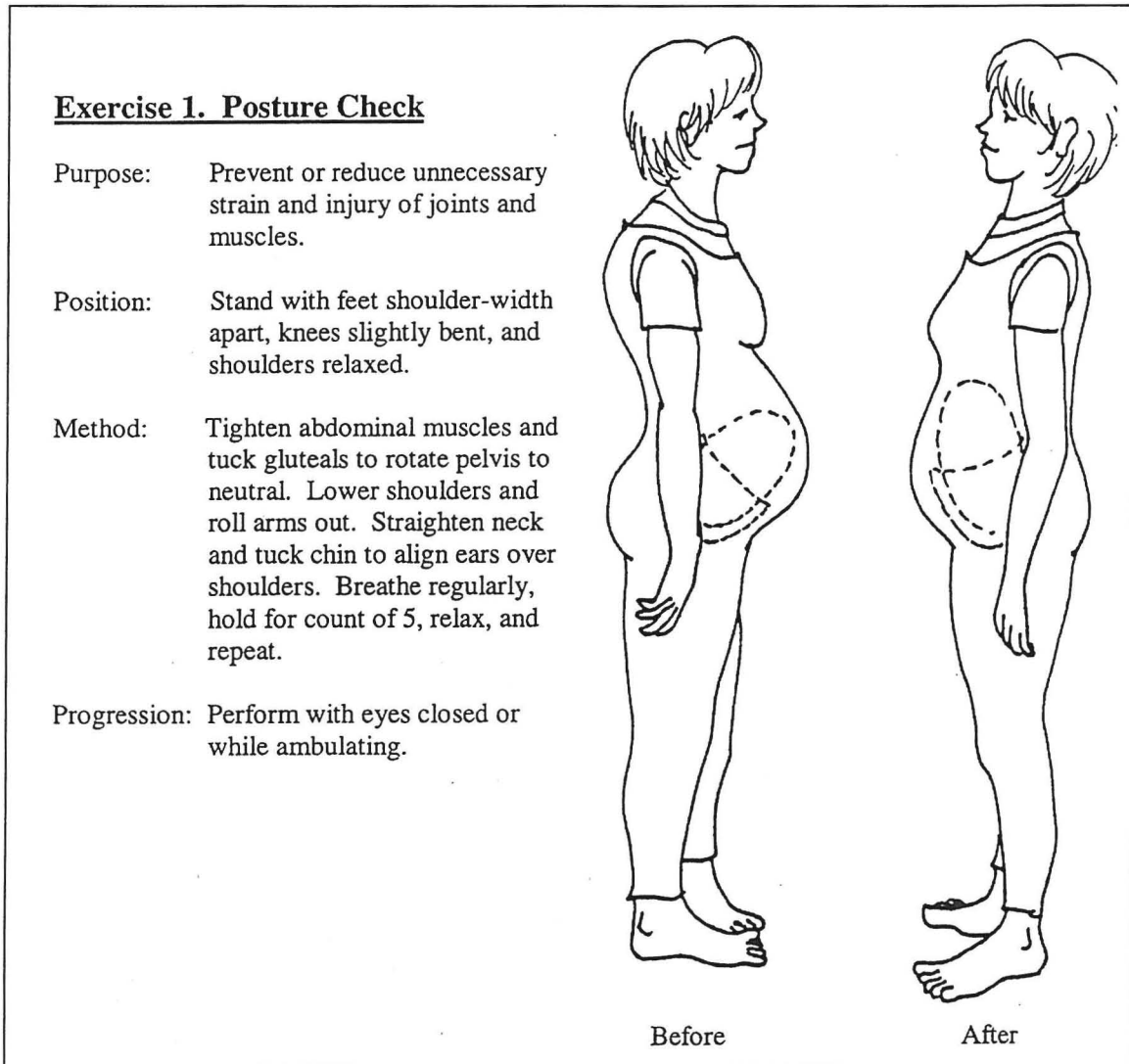


Figure 7. Posture check. Reprinted with permission by S Ripplinger.

Muscle energy techniques are another option of treatment for postural imbalances. However, because the woman may be more susceptible to injury due to laxity, the therapist should be experienced in manual techniques before applying them to clients who are pregnant.<sup>9</sup>

## SCAR TISSUE

### Effects of delivery and childbirth

Tearing during vaginal deliveries may cause soft tissue or muscle injury with residual scarring and pain. One source states that up to 80% of women sustain pelvic floor muscle damage during their first vaginal delivery.<sup>6</sup> In addition, the incision made during an episiotomy or cesarean section may leave scar tissue to replace strong pliable tissue.

An episiotomy is an incision to the perineum to aid in the second stage of labor.<sup>1</sup> The cut is meant to enlarge the opening and stretch the tissues. During this procedure, tissues are damaged, including the pelvic floor muscles. In fact, by definition an episiotomy is “at least a second-degree laceration extending into the underlying muscles of the perineal body region.”<sup>11</sup> The rate of episiotomies is extremely high with 55% of women in 1993 in the United States receiving this aid during birth.<sup>1</sup>

Although no incision to the perineum is made during a cesarean section, an individual still experiences the same changes in the uterus, pelvic floor, and GI system, not to mention the scar tissue in the abdomen.<sup>9</sup> According to Noble,<sup>1</sup> since 1985 the c-section has been the most frequently performed major surgery. One source considered rates above 10% of births performed through c-sections as an excessive percentage; however, 23% of the births in 1992 were being done through cesarean delivery.<sup>1</sup> This may be either an elective or emergency surgery. Most commonly, a cesarean section is performed when the baby is in breech position, fetal distress, or slow and difficult labor.<sup>9,36</sup> These cases warrant the need for the special delivery and can save both the mother and the baby.

During a cesarean section, an incision is first made in the skin, fat, and the connective tissue. Then the abdominal muscles are separated and a cut is made through the covering of the internal organs. Finally the bladder is moved and an incision is made to the uterus in order to remove the baby. As with any abdominal surgery, the abdominal muscles are incised, and scar tissue will develop within each layer to restore the tissues. The incision may be a low transverse, low vertical, or classic cesarean.<sup>36</sup>

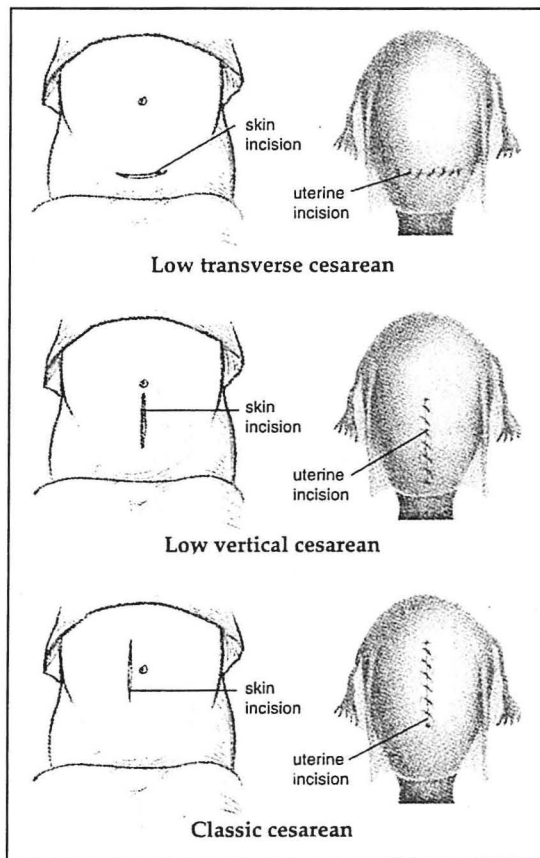


Figure 8. Cesarean incisions. Reprinted with permission of Childbirth Graphics.<sup>36</sup>

### Potential problems

When the injured area needs greater regeneration of tissue than one's body can provide, new connective scar tissue develops and does not allow normal function of these

tissues. This scar tissue is a special connective tissue that has different stress/strain relationships and viscoelastic properties than the original tissue.<sup>37</sup>

Improper healing of the tissues can cause a hyperirritable area of scar tissue. This is an area where spasms and trigger points may develop. Secondly dysparenia, painful intercourse, may result. Fleming<sup>38</sup> agrees that dysparenia is a significant problem affecting 30% of those who had an episiotomy. These women still reported a mild discomfort during intercourse at six months following childbirth. However, this was not the case for women who tore naturally leading us to believe that the tissues may heal more effectively with natural birth. A sample studied by Hay-Smith and Mantle found that 60% of women after vaginal birth experienced superficial dysparenia.<sup>39</sup> They complained of decreased sexual enjoyment and limited frequency of intercourse subsequently due to pain.

Dysfunction in the perineal region can lead to pelvic floor dysfunction resulting in a loss of support to pelvic contents, decreased sphincter control, and impaired sexual satisfaction. The pelvic floor area needs to be restored to provide proper function for women with a c-section and vaginal birth.

Finally, the pain from the incision of the c-section may make it difficult to stand with good posture and apprehension might provoke one to protectively lean forward over the incision. If the healing tissues are not stretched, binding of the scar tissue and further adhesions may result. Furthermore, scar tissue adhesions may impede normal tissue function and lead to musculoskeletal dysfunctions such as low back pain. Lastly, the function of the abdominal muscles to support the spine may be impaired contributing to low back pain.

## **Prevention**

Fascia surrounds all muscles including their fascicles, fibrils, and microfibrils. It also covers the bones and joints. It is important to assess and treat the myofascial system as "a three dimensional web of connective tissue."<sup>11,37</sup> The stresses already described such as trauma of childbirth with resultant scar tissue formed, muscle imbalance, adhesions, and pain can cause dysfunction of the myofascial system.<sup>11</sup>

In order to keep the scar tissue to a minimum, soft tissue techniques can be applied. The goals of treatment are to allow the injured area to heal, restore anatomical relationship between tissues, maintain normal function of the non-injured tissues, and prevent excessive strain on the healing tissues.<sup>37</sup>

Stretching of the perineal tissues is one of the soft tissue techniques that may even prevent tearing with childbirth. It may be performed at the beginning of the 34th week or six weeks before the patient's due date to prepare the vaginal opening and perineal tissues for childbirth. Recently it has been found that women with no previous vaginal deliveries experienced an increased likelihood to deliver with no perineal trauma. When perineal massage was performed during the third trimester.<sup>40</sup> Special instructions are provided in Appendix C for perineal massage, a massage to tissues between the vagina and anus.

## **Treatment of Perineal Scar**

Immediately postpartum, ice can be used for 10-15 minutes for the first 24-36 hours for pain relief.<sup>8</sup> Pelvic floor exercises such as contract relax will be most beneficial for increasing the blood flow to the wound.<sup>41</sup> Sleep and Grant,<sup>42</sup> found that at three months after childbirth the perineal pain was decreased in women who performed an exercise regime of pelvic floor exercises. Discomfort from the stitches is alleviated by

decreasing painful muscles tension caused from the incision, generalized tension, or excessive sitting.<sup>1</sup>

A perineal scar may only take 2-3 weeks to heal but sensitive scars will continue to be bothersome during intercourse.<sup>1</sup> Treatment of this abnormal tissue can begin once the tissues are healed and can consist of massage, ultrasound, pelvic floor exercises, or other modalities. Massage is an effective technique for scar management. It will cause the new growth to organize in an ordered fashion similar to the strong pliable tissue.

Friction massage is a deep tissue technique that can break adhesions. The collagen fibers respond to stress in multiple direction. Three techniques are used to break adhesions including massaging along the grain of the scar, against the grain, and bending the scar between the thumb and forefinger (Appendix D). For the maximal benefit, the massage should be done 2-3 times a day for 5-10 minutes; however, the length of time spent on scar massage depends on the patient's tolerance.<sup>11</sup> Jenkyns and Shelly,<sup>11</sup> suggest spending one to three minutes at each tender point. This massage time can be progressively lengthened up to twenty minutes.

The therapist, the patient, or their partner may perform massage. Jenkyns and Shelly<sup>11</sup> have devised a detailed list of instructions to follow when providing treatment to this sensitive area. When a physical therapist performs the massage, the following list of instructions can be used as a guide: 1) describe the procedure to the patient 2) make her comfortable in a hook-lying position 3) don gloves 4) start techniques by using pressure of the index finger at one end of the scar line. Find tender points indicated by resistance or hardness under your finger and the response from the patient. One can utilize friction



massage by moving back and forth slowly over the tender point without sliding on the skin. Sustained pressure to the tender point can also aid in loosening the scar tissue.

The patient may opt to perform a self-perineal massage.<sup>11</sup> The instructions are similar and listed as followed: 1) instruct patient to wash hands 2) have patient choose a position: half-seated, half-kneeling, standing with one leg on a stool, or side lying 3) use one thumb and index finger to press on the scar tissue as described as above 4) repeat the massage daily.

The therapist must remember that effective perineal massage is often painful; therefore, the therapist may want to consider partner massage. Instructions for partner perineal massage includes: 1) invite partner to the therapy session 2) explain the procedure and role to the partner 3) demonstrate the massage technique using the hand and thumb web space<sup>11</sup> 4) perform the treatment asking the patient to pay close attention to the depth of the massage and location so her feedback to her partner is accurate 5) partner dons a glove, which is not necessary at home but hands should always be cleaned thoroughly 6) repeat the massage technique at each tender site.

The effectiveness of the massage may be increased through use of modalities such as heat or ultrasound before the massage.<sup>11</sup> According to the Gynological Manual,<sup>11</sup> ultrasound is an appropriate treatment of pain and edema in obstetric and gynecological patients with the indications of episiotomy, perineal laceration, dyspareunia due to soft tissue adhesions, gynecological surgery scars, and hemorrhoids, all of which may result from childbirth. Ultrasound provides both thermal and nonthermal effects and accelerates wound healing.<sup>43</sup> Anticipated results includes decreased pain, increased

blood flow, increased tissue extensibility, reduced hemorrhoid size, enhanced tissue healing, decreased spasm, and increased tissue repair.<sup>11</sup>

Ultrasound can be applied to this sensitive area throughout the healing process. Water immersion ultrasound is a technique that may be used immediately postpartum. A gel couplant can be used directly on the area after scar tissue has been formed and the patient is at least six weeks postpartum. Other ways to treat the perineal area include a water filled condom or transmission gel inside the condom. Contraindications to performing ultrasound treatment include pregnancy, infection of the perineal tissues, malignancies and precancerous lesions, anesthetized area, or ultrasound over the ovaries.

### **Treatment of Abdominal Scar**

For the women who have undergone a c-section, it is vital to treat abdominal scarring as a dysfunction that could disrupt the myofascial system. The adhesions can lead to musculoskeletal problems such as low back pain or postural dysfunction.

Hakeem,<sup>17</sup> suggests first instructing scar desensitization that helps the women get used to the feeling of the scar and to decrease any hypersensitivity that may occur. The patient may only tolerate rubbing a soft cloth over the scar for a short time until the tissues are less sensitized. Proceed to more aggressive techniques when the patient is ready. Advanced techniques such as push pull, skin rolling, and plucking are described in Appendix D. These should be demonstrated and most patients are able to perform them successfully.

### **Treatment of Painful Intercourse**

Education is the key to obtaining pain free intercourse. A physical therapist should discuss experimentation of different coital positions that may be less painful.

Vaginal lubricants and friction massage may desensitize the area of discomfort and pain if scarring is an issue.<sup>11</sup> Also, treating the underlying trigger points or musculoskeletal dysfunction in scar tissue or the pelvic floor muscles may be necessary.

### **Treatment of C-Section**

A physical therapist may see a patient acutely following this major surgery and at this time education is the key. Like other major surgeries, physical therapists can discuss early mobilization with tips on how to initiate activity and decrease the pain including transfer training. Splinting with a pillow at the incision site when straining is another way to decrease unnecessary pain. Bowel reflexes and movement of gas can be facilitated by the patient through clockwise massage of the abdomen following the path to the colon.<sup>26</sup> Good lung hygiene is encouraged by performing deep breathing exercises and should also be included. A home exercise program targeting the abdominal, perineal, and upper back muscles should be offered. This program should also include education for good body mechanics, valsalva avoidance, and comfort measures/positions. These instructions are essential to minimizing postoperative complications. However, remember that the mother may feel fatigued and require slow progression.

If the patient meets the criteria, a therapist may recommend a patient be seen on an outpatient basis for physical therapy treatment. Physical Therapy is recommended for those with back pain greater than a 5/10 on a visual analog scale or a painful scar greater than 5/10 at seven days following surgery. Finally, the patient should be seen if she has developed urinary or fecal incontinence precipitated by this delivery. Hakeem,<sup>17</sup> recommends discharge from therapy after 2-4 visits and when symptoms improve.

Scar tissue adhesions can and should be prevented from leading to dysfunction. A mother has little time to invest in care for herself so importance of scar management should be stressed prior to the pregnancy. The women will then know what is normal and what is to be expected following childbirth to avoid unnecessary problems.

## **CARDIOPULMONARY SYSTEM**

### **Changes with Pregnancy**

Pregnancy changes every aspect of a woman's body including the effects it has on the cardiovascular and pulmonary systems. These systems are stressed from the changes that occur in pregnancy. By the first trimester, cardiac output will increase by 30-50%<sup>8,44</sup> and the total blood volume will increase up to 5.5 liters from four liters, which allows for the average blood loss of 500 milliliters during delivery.<sup>45</sup> This increase in blood volume requires the heart to work harder. Because of the increase in total blood volume, the blood vessels must dilate to decrease peripheral resistance to meet the increases in oxygen demands of the fetus and the mother. Despite the dilated blood vessels, women have a rapid throbbing pulse during pregnancy. In fact, the heart rate will gradually increase by 10-15 beats per minute by full term.<sup>26,44</sup>

Regardless of all the cardiovascular changes, blood pressure is not significantly affected. The diastolic blood pressure may decrease slightly mid pregnancy but will return to normal in late pregnancy.<sup>8</sup> However, a condition called supine hypotension may occur secondary to increased pressure on the inferior vena cava when the mother is in supine.<sup>8,46</sup> Symptoms range from dizziness and lightheadedness to severe syncopal shock.<sup>8</sup> Generally, sources recommend that treatment positions be modified to prevent any discomfort to the patient that may occur in this position. Some guidelines advise

avoiding supine position after four months of pregnancy<sup>46,47</sup> while others simply encourage therapists to avoid this position for prolonged periods with vigorous exercise and change positions if symptoms occur.<sup>1</sup> Kinsella and Lohmann<sup>48</sup> state that left side lying usually gives symptomatic relief.

The respiratory system is also stressed by the increased oxygen demand. Hormones such as progesterone increase leading to a natural state of hyperventilation. A mother may also feel short of breath due to the pressure of the enlarging uterus on the diaphragm and due to the congestion in the lung capillaries.<sup>8,9</sup> These three factors can cause symptoms such as lightheadedness or nausea, and, therefore, exercise that causes labored breathing should be avoided.<sup>47</sup>

Two weeks following childbirth, the cardiovascular system will eventually revert to normal, and the total blood volume will return to the pre-pregnancy values in six to eight weeks after delivery.<sup>8</sup> The uterus will return to normal size in about six weeks relieving both pressure on the diaphragm and the risk of supine hypotension.<sup>46</sup> These gradual changes should be taken into consideration when prescribing recommendations for exercise following childbirth.

### **Benefits of Exercise**

Despite the numerous physical changes a mother endures, women may still exercise during pregnancy in order to maintain a positive body image. Butler<sup>46</sup> reported that exercise can help moms to prevent backache, poor posture, fatigue, and excessive weight gain by promoting a healthy lifestyle. Moreover, Clapp<sup>49</sup> demonstrated that exercise markedly decreases the usual musculoskeletal complaints associated with pregnancy. Other commonly cited benefits of prenatal exercise programs include

facilitation of recovery from labor; enhanced maternal psychological well being that may help counter feeling of stress, anxiety, and depression; and establishment of permanent healthy lifestyle habits.<sup>46</sup> These exercise habits can prevent many of the dysfunctions discussed earlier such as postural syndromes and pelvic floor/abdominal weakness.

If a woman does not wish to partake in aerobic exercise during pregnancy, she is still encouraged to focus on the essential exercises including pelvic floor, abdominals, and posture awareness.<sup>1</sup> Whether a mother chooses to do the essential exercises or a more established exercise routine, she can continue to achieve maternal health benefits from exercise with minimal fetal risk if done properly and within established guidelines.

### **Potential Risks of Exercise**

While fetal risk is minimal during exercise when following proper guidelines, there are still possible adverse effects. One of the potentially adverse effects to the fetus during exercise is the inadequate availability of oxygen for both the mother and fetus. This inadequate availability results from a shift of blood flow from internal organs, including the uterus, to the muscles during exercise. However rare, the fetus may also experience hyperthermia-induced fetal distress or associated birth abnormalities and thus increased uterine contractions may result.<sup>50</sup> Even though the effects sound dangerous, no human studies have proven that exercise needs to be limited for fear of harmful effects on the growing fetus. This is true for women who do not have any risk factors for maternal or perinatal outcome.<sup>47</sup> Regardless, there is a continuing need for research on parameters of safe and appropriate levels of exercise.<sup>50</sup>

## **Guidelines for Exercise**

Despite the lack of specific guidelines, general guidelines have been established to guarantee safety of the mother and fetus. The American College of Obstetricians and Gynecologists<sup>47</sup> has set guidelines that are recommended for women to follow during pregnancy. The 1994 modified, more liberal version of the ACOG advises health care professionals to provide an individualized exercise prescription for women during and following pregnancy. Specific details are listed in Appendix E for further reference.

Women who are currently participating in a regular exercise program can continue their training without major modifications. On the other hand, women who seek exercise guidance and plan to begin an exercise program after becoming pregnant must first receive clearance from their health care provider who should be aware of the contraindications to exercise. Contraindications for both types of women include the following: pregnancy induced hypertension, preterm rupture of membranes, preterm labor during the prior or current pregnancy or both, incompetent cervix/cerclage, persistent second or third trimester bleeding, intrauterine growth retardation, or multiple gestation.<sup>50</sup>

Literature and studies conclude that a woman can exercise safely throughout pregnancy if she listens to her body and prevents overheating/overdoing it.<sup>46</sup> Many warning signs indicate the need to stop exercise and should be communicated to the woman. Butler<sup>46</sup> lists these five warning signs: 1) Pain: slow down and listen to your body. 2) Bleeding: vaginal bleeding or spotting. See health care provider immediately. 3) Dizziness, shortness of breath, palpitations, faintness, or rapid heartbeat. Any one of

these is a signal to stop exercise. 4) Pubic pain. 5) Rupture of uterine membranes or regular uterine contractions: Stop exercise and call your health care provider.

Additional warning signs to stop exercise include decreased fetal movements, persistent nausea and vomiting, back and hip back, and difficulty walking.<sup>46</sup> After delivery, women should expect bleeding for two to four weeks which will gradually diminish. However, if the bleeding becomes heavy, she should use this as a warning sign to slow down. The mother may be physically exerting herself and the body reminds the mother of this.

### **Exercise Prescription**

Sources agree to leave strenuous workouts until after pregnancy and focus on moderate activity while pregnant. During pregnancy, all the cardiovascular changes require more strain on the heart, and, therefore, the women may not be able to exercise at the same intensity. Mothers are encouraged to use common sense. Unlike in their non-pregnant state, a mother should not push herself to a point of pain. Women who are initiating a routine should begin with low-intensity and low to non-impact activities. Regular exercise is preferred to intermittent activity.<sup>50</sup> Guidelines of three times per week were given by the ASCM. Finally, activities that may cause injury to the abdomen should be avoided all together. Many sports such as basketball, soccer, water-skiing for example could cause trauma to the abdomen.

Instructions on ideal heart rate using the rate of perceived exertion (RPE) scale should be given. The RPE is the preferred method because the resting heart rate is already increased by 15 beats per minute. The talk test, the ability to maintain a



conversation during exercise without being short of breath, is another subjective method of monitoring intensity levels that may be utilized during pregnancy.

The fetus relies on the mother to rid the body of heat produced with exercise, and, therefore, women should avoid exercise in hot or humid climates or if they have a fever. Instead, pregnant women should choose air conditioned locations or workout in a pool. Women can counteract the effects of heat by drinking plenty of water to avoid dehydration. A mother's temperature should be kept below 38.9 degrees Celsius or 102 degrees Fahrenheit for the safety of the fetus.

Overall, health and fitness should be promoted throughout the lifecycle. During pregnancy, new demands are placed on the mother and her developing baby. As a health care provider, guidelines should be given to ensure correct and appropriate exercise. Physical therapists have the knowledge to provide this information to women during the childbearing years.

## **CHAPTER III**

### **METHODOLOGY**

#### **Subjects**

Postpartum women who are receiving postnatal care in the Grand Forks or Devils Lake communities and are over 18 years old could voluntarily participate and be included in this project. The women must have given birth within six months of filling out the survey in order for it to be valid. The patient's consent was assumed if the survey was completed and returned.

#### **Instrumentation**

A two-page survey and cover letter was given to the participants (see Appendix F). This survey requests information in both a quantitative and qualitative format. Data includes information on services/information acquired during and after pregnancy.

An explanation of the benefits, criteria, guarantee of confidentiality, and a statement of voluntary participation to begin this survey was discussed in the cover letter. Patients were encouraged to speak to their doctors if concerns arose and were provided with the names of health care professionals in physical therapy if they wished to seek treatment.

University of North Dakota (UND) Physical Therapy students Christel Parvey and Tami Parker developed the questionnaire with the assistance of UND faculty, Associate Professor Bev Johnson and UND Instructor Cindy Flom-Meland. It was revised by three physical therapists actively working with women's health issues: Laurie Betting, Leatha

Vaagen, and Megan Boyd. Finally, it was supported by local prominent physicians in this field.

### **Procedure**

The survey was provided to the nurses of participating doctors who supported this project. It was handed out by the nurse or receptionist at a woman's six-week appointment following childbirth and filled out while the client waited for her appointment. Women who have given birth within six months were also included in the survey secondary to patients not always attending their six-week checkup. A self-addressed envelope was provided along with the survey; the patient then sealed the survey in the envelope and returned it to the nurse or receptionist upon completion. The completed surveys were stored in a folder until picked up by the investigators. The participating facilities were instructed to store the sealed envelopes in a file cabinet to further insure confidentiality. The investigators collected these surveys on a weekly basis at certain locations, while the remaining institutions preferred the patient to mail the completed surveys. Postage was paid by UND Physical Therapy Department. The collection period extended from July 17 to October 20, 2000.

### **Data Analysis**

Traditional descriptive statistics were used to assess the need for program development and assess awareness and compliance in women of childbearing years. We used the information that was being provided to these women and compared it to an ideal or optimal program based on a literature review.

## **Data Reporting**

Results of this survey are described in this Independent Study Report. The report is available at the University of North Dakota Harley French Medical Library. This information was also shared in aggregate with participating facilities and health care providers. Health care professionals can then utilize this information to develop programs and better address issues that are missed between professionals to better serve their patients.

## CHAPTER IV

### RESULTS

Fifty-eight of the 64 surveys returned met the established criteria. The six not included either failed to meet the mother's age requirement ( $\geq 18$  years old), could not determine whether childbirth was within a six month time frame, was not received by the deadline, or was not from the selected facilities.

#### General Demographics

The age of mothers responding to the survey ranged from 18 to 41 years with an average age of 27.8 (SD= $\pm 4.9$ ). The surveys were handed out at the following Grand Forks, North Dakota facilities: Altru Family Medicine, Altru Main Clinic, and UND Family Practice; the other studied facility was located at the Lake Region Clinic in Devils Lake, North Dakota. The majority of respondents (78%) received care in Grand Forks, and 40% of women were first time mothers. The majority of women experienced a vaginal delivery (93%) with 43% occurrence of episiotomy. Only 15% reported a C-Section with any delivery. Refer to Table 1 for an inclusive subject profile.

#### Problems

A list of six common problems in pregnancy was addressed with a yes/no option. The data was divided and analyzed by women experiencing vaginal, episiotomy or cesarean section during delivery. A comparison was made between the number of problems seen and the percentage of women experiencing them. Data was spread

between all categories with women experiencing anywhere from zero to six total problems for vaginal deliveries, with an average of 2.16 problems per woman. Women with episiotomies reported an occurrence of zero to five problems with an average number of problems being 2.17 per woman. Finally, out of the eight respondents who had a c-section, five women reported experiencing two problems.

Table 1. General Demographics

	<u>N</u>	<u>%</u>
Where did you receive your prenatal/postnatal care?		
Altru Family Medicine Center, Grand Forks, ND	8/59	13.5
Altru Main Clinic OBGYN, Grand Forks, ND	21/59	35.5
UND Family Practice, Grand Forks, ND	17/59	29
Lake Region Clinic, Devils Lake	13/59	22
Number of full term pregnancies		
One	23	40
Two	22	37
Three	12	21
Four	0	0
Five	1	2
Number of women who had vaginal deliveries	54/58	93
Number of women who had an episiotomy	23/54	43
Number of women who had a C-Section	8/53	15
Women who walked during pregnancy 3+ times/week	25/45	56
Women who walked after pregnancy 3+ times/week	22/39	56

An analysis of women experiencing each problem individually was also compared between vaginal, episiotomy, and C-Section. Low back pain (LBP) during pregnancy was the predominant problem seen in all three categories. Even though the C-Section sample size was too small to draw any significant conclusions, it is interesting that all

eight women experienced LBP during pregnancy. The second most common problem, stress urinary incontinence, was seen in 47% of women with vaginal deliveries and 61% following an episiotomy (Figure 9).

Women who sought treatment for the problems seen in the childbearing year was exceedingly low. Three of thirteen women (23%) sought help for weak abdominals, while three of eleven (27%) sought help for pain with intercourse. Women seeking treatment for LBP included thirteen of 43 women (30%). Ten of these thirteen women sought treatment from a health care provider. Finally only one of the 23 (4.3%) women with incontinence sought treatment.

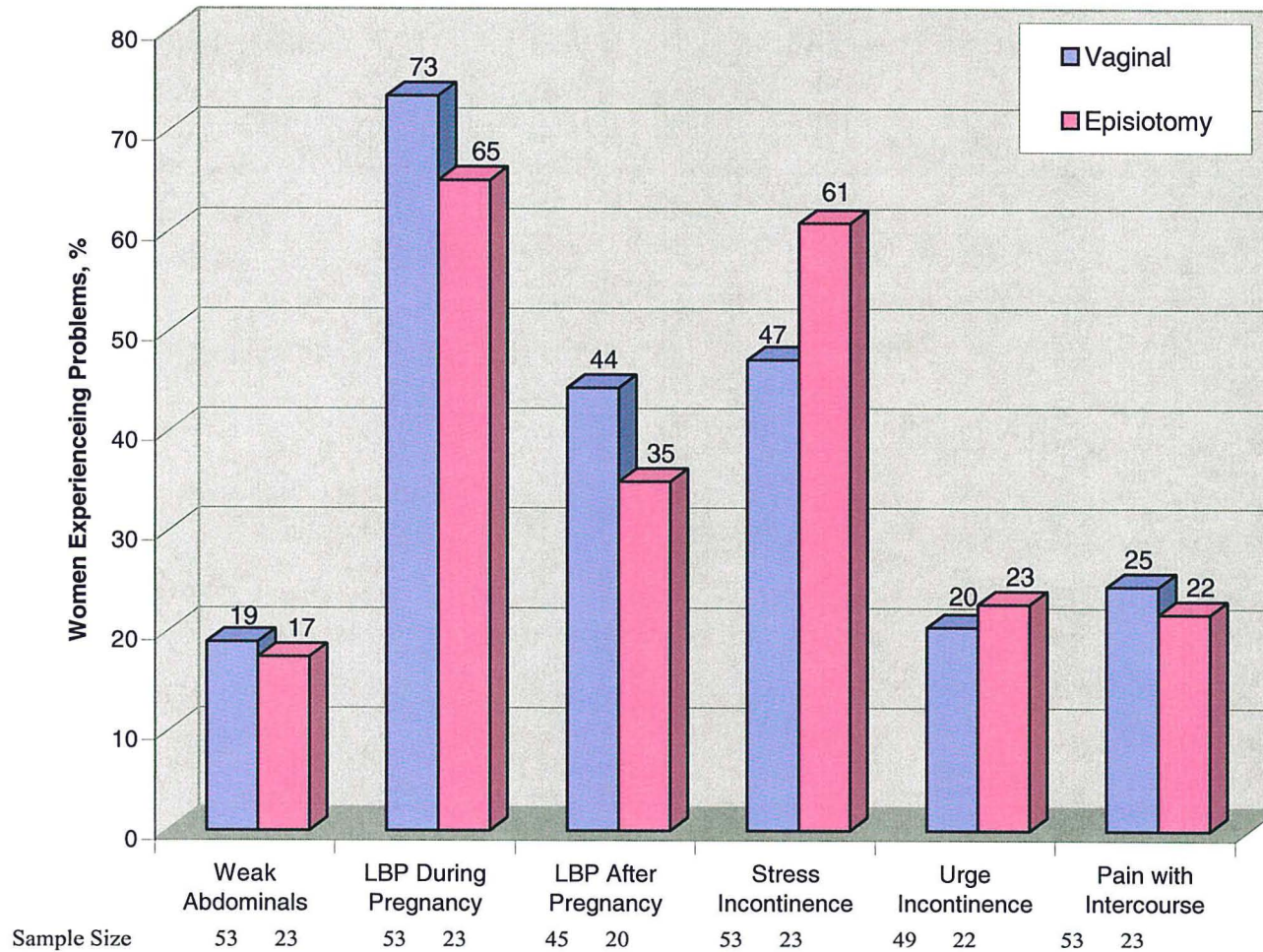
### **Respondant's Comments**

Of the ten women who sought treatment for LBP from health care providers, one sought chiropractor treatment, three went to the Physical Therapy (PT), and two individuals received both PT and chiropractic care. The other women who sought treatment did not specify from where.

### **Information**

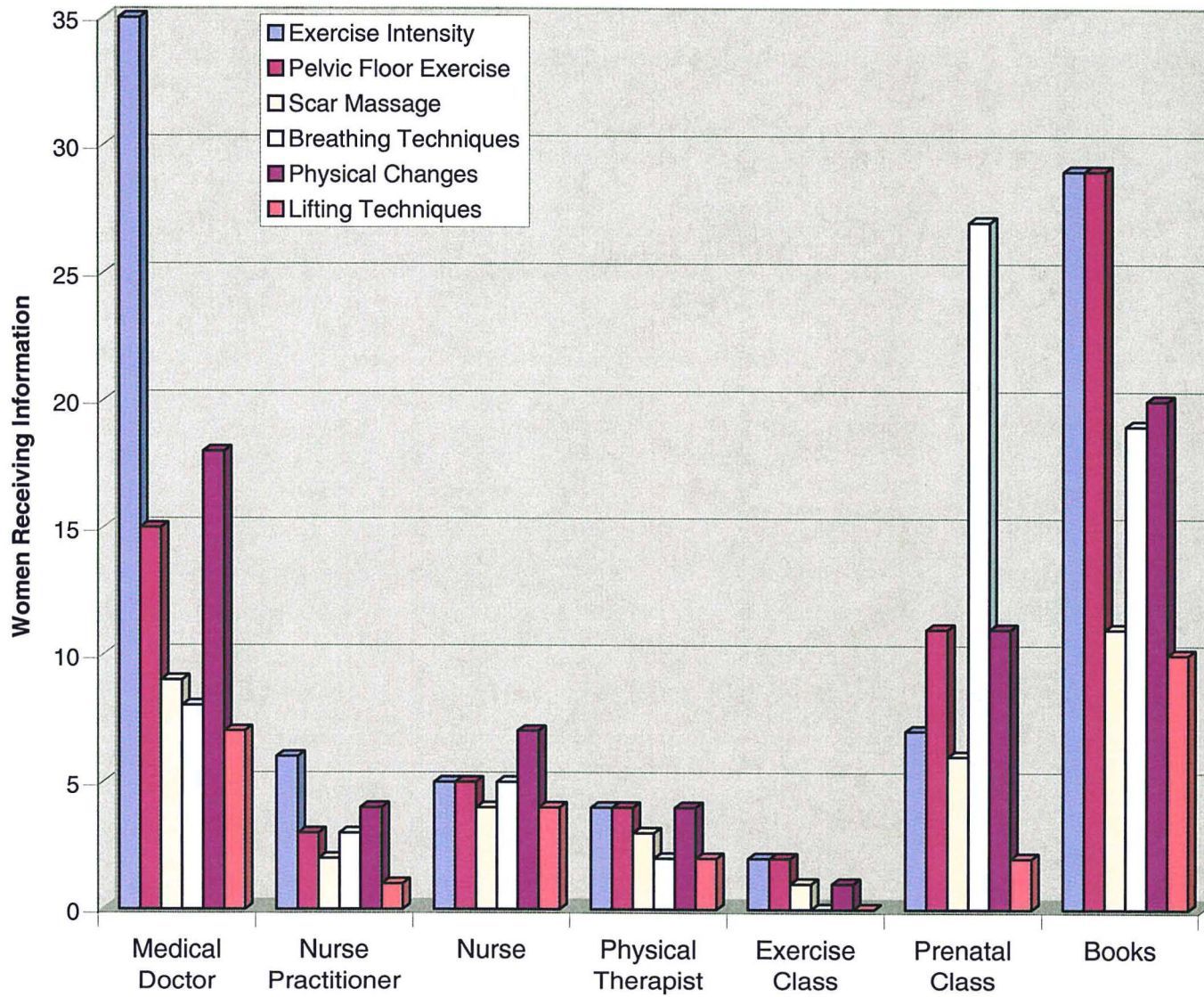
Women were asked if they received information on various pregnancy issues and also indicated who provided the information. Women were given seven choices and were able to select multiple resources (Figure 10). Books and medical doctors were utilized most often, being selected a total of 118 and 92 times, respectively. This was followed by sixty-two women who received information in a prenatal class. All other disciplines were selected #30 times. Exercise intensity was the most addressed issue (88 women received information) followed by pelvic floor exercises (69), physical changes (65) and breathing techniques (64). Refer to Table 2 for complete summary of data.

### Number of Problems Experienced



**Figure 9. Common problems with pregnancy.**





**Figure 10. Sources of health information.**

Table 2. Number of women receiving information on various pregnancy issues

	Source of Information							Total
	<u>MD</u>	<u>NP</u>	<u>N</u>	<u>PT</u>	<u>ExC</u>	<u>PreC</u>	<u>Books</u>	
Exercise Intensity	35	6	5	4	2	7	29	88
PF exercises (Kegel's)	15	3	5	4	2	11	29	69
Scar massage/mobility	9	2	4	3	1	6	11	36
Breathing techniques	8	3	5	2	0	27	19	64
Physical changes	18	4	7	4	1	11	20	65
Correct Lifting Techniques	7	1	4	2	0	2	10	26

### Exercise

Women also commented on physical activities performed before and after childbirth. Walking was the predominant activity occurring a rate of 77.6% during pregnancy and 68.4% following pregnancy. Biking, swimming, performing aerobics, running, lifting weights, or other activities were reported in less than 15% of women either during or after pregnancy (Figure 11).

Not all of these women exercised on a regular basis, defined by ACOG guidelines as 3 or more times/week. Twenty-five of the 45 women (55.5%) walked regularly during pregnancy, while 22 reported regular walking (56%) after pregnancy. The one respondent who ran during pregnancy did so on a regular basis, as well as those respondents who ran after pregnancy (2/2). Trends showed that aerobics and "other" exercise were also done more consistently than the additional choices of exercise. Five of the six women performing aerobics did so three or more times per week during pregnancy, and five of eight participated in a regular program after pregnancy. "Other" exercise was performed

### Exercise Performed

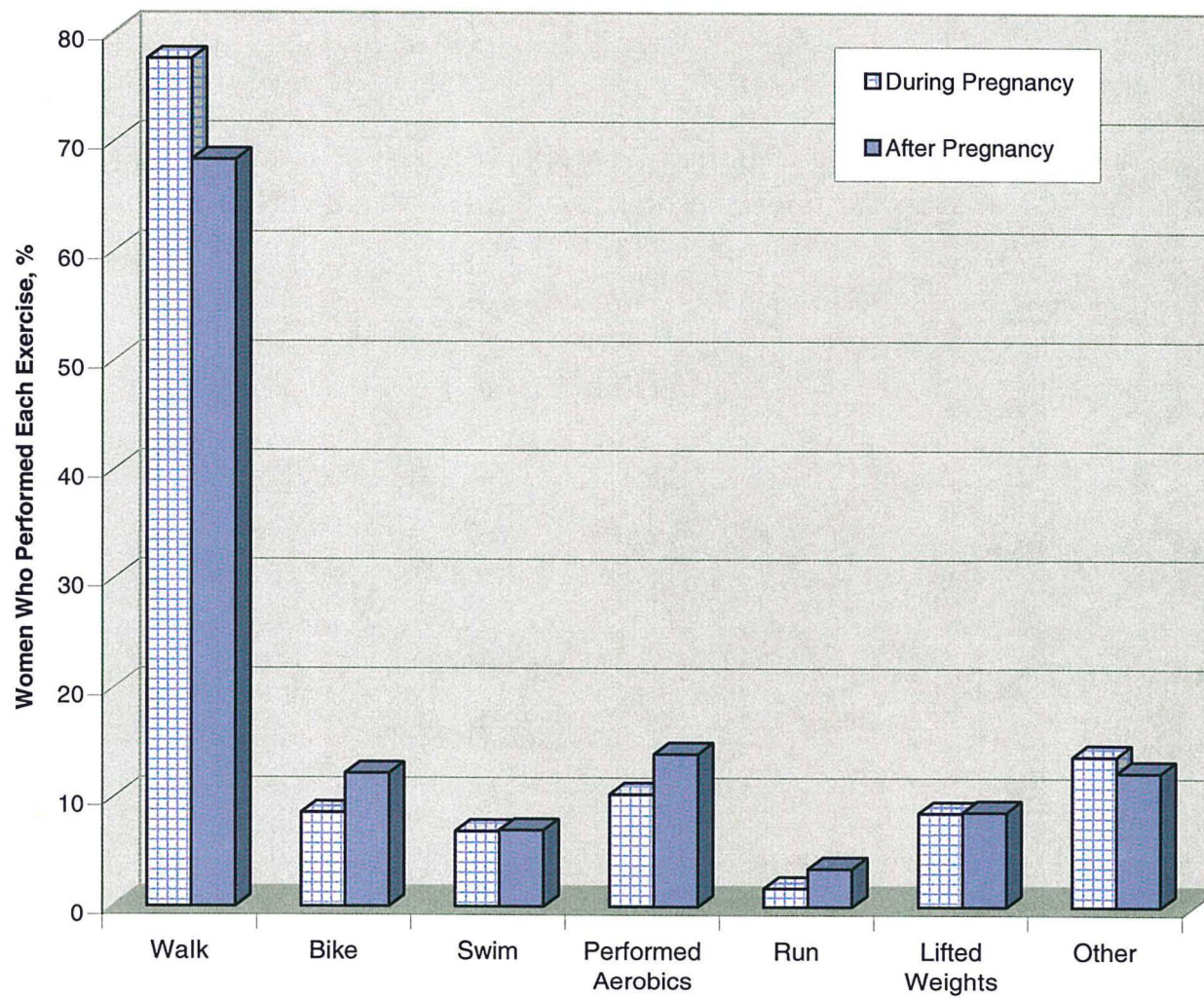


Figure 11. Exercise during and after pregnancy.

by five of eight women during pregnancy and five of the seven women following childbirth. (See appendix G for specific findings.)

The median number of months that women exercised during pregnancy was 6.5 months with a mode of was all nine months. Half of the women started exercise within four weeks following childbirth while within two weeks was the most prevalent (mode) starting time.

Women were asked if at any time during pregnancy they performed PF exercise. Overall 71% of all the women surveyed said yes they performed the exercises with 51% occasionally performing the exercises. Out of the 54 women with vaginal deliveries, 40 (74%) responded that they performed these exercises. The majority (26/40) of the women performed these exercises on an occasional basis both during and after pregnancy. Twenty-two of thirty-three women who responded felt these exercises were beneficial. Eighteen of twenty-three women (78%) who had an episiotomy with any pregnancy reported that they performed PF exercises. The majority (11/18) occasionally performed these exercises both during and after pregnancy. Twelve of seventeen felt these were beneficial. Finally, four out of eight women experiencing a c-section responded that they performed PF exercises. All four performed these exercises both during and after childbirth. See Table 3 for complete data.

Twenty-six comments were made regarding whether women felt these exercises were beneficial. Seventeen of these women added comments explaining the advantages. Sixteen of the seventeen comments utilized a correct rationale for performing these exercises, such as for bladder control and PF muscle strength, while one woman did not understand the function of the PF muscles during labor. One negative comment was

made, while eight women were unsure if the exercises were beneficial. Three of the eight women that were unsure didn't think they performed them enough to report beneficial or not since they only performed the exercises occasionally.

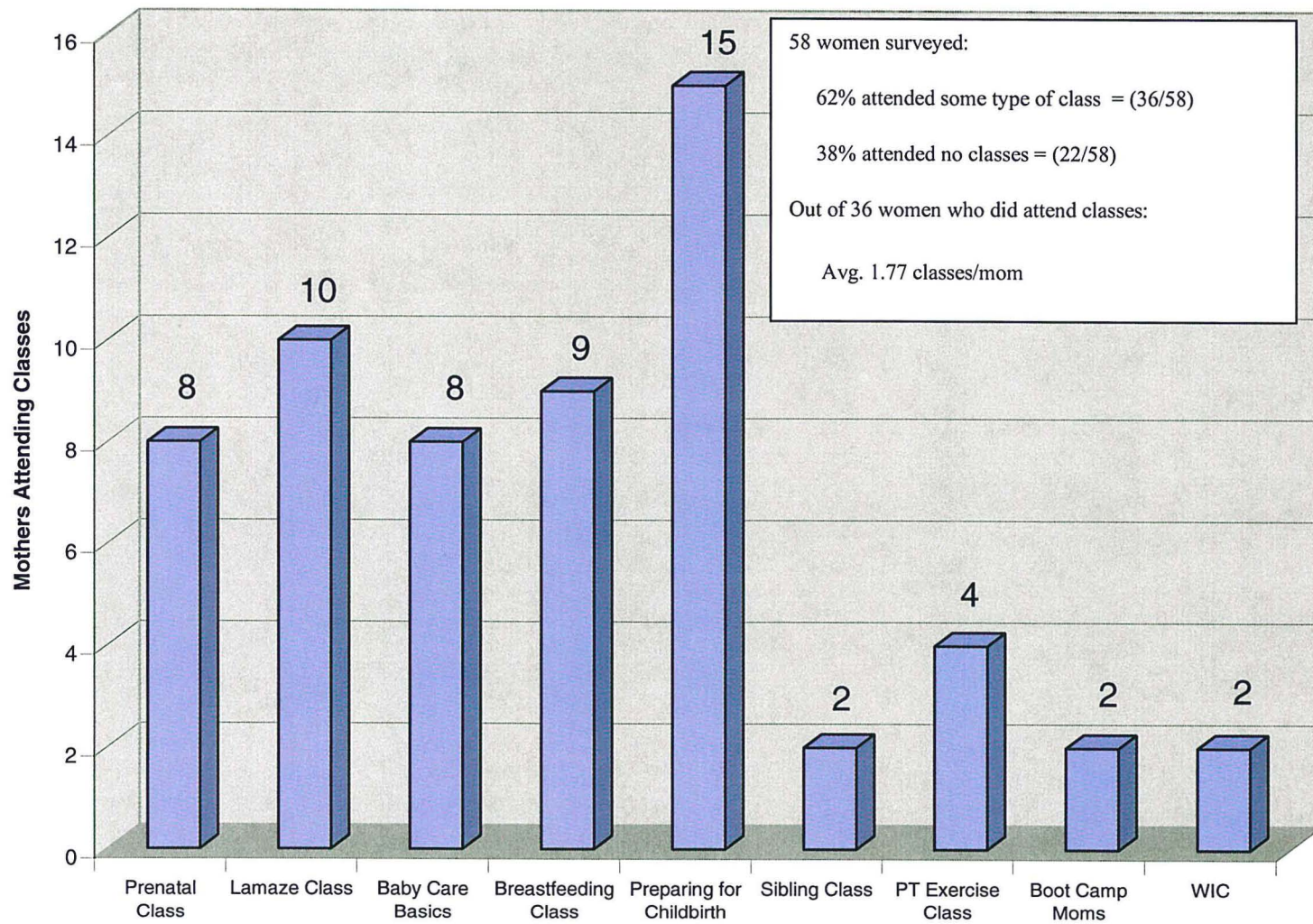
Table 2. Pelvic Floor Exercises

		Vaginal Delivery		Episiotomy		C-Section	
		<u>n/N</u>	<u>%</u>	<u>n/N</u>	<u>%</u>	<u>n/N</u>	<u>%</u>
Performed PF Exercises		40/54	74	18/23	78	4/8	50
When?		<u>n/N</u>		<u>n/N</u>		<u>n/N</u>	
	Prepartum	10/40		4/18			
	Postpartum	4/40		3/18			
	Both	26/40		11/18		4/4	
How Often?							
	Occasionally	20/40		10/18		2/4	
	1-9 times/day	14/40		6/18		1/4	
	10-20 times/day	6/40		2/18		1/4	
Feel they were beneficial?							
	Yes	22/33		12/17		2/3	
	No	3/33		1/17			
	Unsure	8/33		4/17		1/3	

### Classes

The majority of moms (62%) attended some type of pregnancy class, past or present pregnancies, in the childbearing year. Of these women, the most popular class to attend was a preparing for childbirth class (15/36). Women attended an average of 1.77 classes in the childbearing years (Figure 12).

Women commented on what information they thought was beneficial. All forty of the women responded positively, and ten of the women commented that all of the



**Figure 12. Classes attended.**

information was valuable. Breathing techniques (14) was the most popular theme followed by breastfeeding (4) and what to expect (3). See appendix G for a complete list of comments.

## CHAPTER V

### DISCUSSION

Research has been conducted on the effectiveness of physical therapy treatment techniques and has shown success in treating common musculoskeletal problems for women throughout their childbearing years. However, this project confirmed that there are still many untreated problems and that a lack of knowledge still remains. Following are some of the findings and possible reasons for this phenomenon.

The survey results show that the percentage of women who had an episiotomy was slightly lower in this study (43%) compared to national numbers (55%) from 1993. Similarly the c-section rate was lower in this region (15%) when looking at national rates (23%) from 1992. Our study did not show a difference in the number of problems between vaginal delivery (2.16 problems/woman), episiotomy (2.17 problems/woman), and c-section (2.625 problems/woman). However, one significant difference between these categories was the increase in incontinence problems for those who had an episiotomy.

Overall, there were a large number of women with incontinence, but SUI was the greatest (61%) in women who had an episiotomy. Only one woman with incontinence sought treatment (4.3%). This finding may be explained by the common misconception of women, and possibly the health care providers, that incontinence is a normal part of the childbearing process. This idea is emphasized by the comments made under the



section treatment sought. One woman stated, "it (incontinence) is part of life" and another "(I) experience some leaking with sneezing but cross my legs when I sneeze."

Also, a large number of women performed pelvic floor exercises, but nevertheless multiple problems exist; therefore, we must explore the possible reasons for this. One explanation is that the women may not be able to identify these muscles without a more complete explanation or assessment. Therefore, healthcare providers need to take care and time when providing women with information or books providing adequate explanation or demonstration to determine the ability to perform the exercises effectively. Physical Therapists and other health care providers involved in women's health should seek advanced training in evaluation and treatment of pelvic floor dysfunctions to assure appropriate intervention.

Referral to Physical Therapy is an issue when looking at the number of women experiencing incontinence and the low number of women that sought treatment. We chose the cities of Devils Lake and Grand Forks because there is an established Physical Therapist specially trained in women's health issues in each city. Even with the expertise available, only 4.3% sought treatment. Physical Therapists often depend on the physician referral, and historically the patient depends on the doctors to help provide solutions to these treatable problems. Physical Therapists must educate both physician and women in the childbearing year as to the treatment options available.

Another explanation may be inadequate performance of the exercises. According to Stephenson et al<sup>9</sup>, women should be doing at least 50-100 repetitions daily in order to see benefits. It was found that 20 of 40 women only performed these exercises occasionally. Occasionally was defined as "not on a daily or regular basis." Research on

the most effective and efficient treatment needs to be conducted and then shared with the health care providers who are providing this information to the childbearing community.

Second, when analyzing the number of women experiencing LBP, it was noted that all eight women undergoing a c-section experienced LBP during pregnancy. This cannot be generalized to the population secondary to the small sample size; however, one may consider some possible reasons for this trend. One reason for LBP may be due to the special position of the baby or the increased weight of the child, two indications of a c-section.<sup>9,36</sup>

Low back pain was a persistent problem for women throughout the study with a significant number of women with LBP. Complaints were noted in 73% who had a vaginal delivery and 65% of women who had an episiotomy. Pain may be attributed to poor posture, position of the baby, ligamentous laxity, weak abdominals, or a combination of these factors.<sup>8,9</sup>

Gilleard<sup>22</sup> noted the abdominals decrease function during pregnancy, overall predisposing a woman for LBP. We are unable to make this direct correlation in this study because the term weak abdominals may be subjective. Our intention for this question was to identify women with diastasis recti; however, this terminology and method for self-evaluation would be foreign to most women. Therefore, the term weak abdominals was used. One comment that substantiated the need for education was "yes, I sought treatment but nothing could be done" indicating a need for both the health care providers and patients to understand this condition and the possible consequences of weak abdominals being linked to LBP.

In order to clearly define the dysfunctions and available treatment, we must start at the knowledge level of the health care providers and then women in their childbearing year. It was speculated that the numbers of women reporting weak abdominals was low secondary to insufficient knowledge of this term, especially for women who had a cesarean section with only three of eight women reporting weakness. Following a major surgery such as this, weakness is common for at least six weeks.

The term scar massage/mobility was also a concern. The researcher was unable to determine the effectiveness of scar massage due to the low number of responses available. It is speculated that health care providers are not instructing the women in benefits of scar massage/mobility. One woman commented, "What is this? I would have liked to know more about it."

Another challenge was the ability to distinguish between problems that are solely musculoskeletal in origin when analyzing women who experienced pain with intercourse. In addition to a musculoskeletal problem, pain may also be a result of abuse, psychological, or hormonal issues. This is an area which is often not directly addressed. Also health care providers may not be knowledgeable in the available treatment options. A comment from the survey stated, "the doctor just kept telling me to wait or quit having sex."

One possible reason for this lack of knowledge of conditions and treatment options for the above problems could be attributed to the source of information. A bulk of the information was received from doctors and reading material, selected 92 and 118 times respectively. Physicians may not have the time to fully address the problem and women may not obtain adequate applicable information from books and pamphlets. A mechanism health care providers could capitalize on is pre-natal classes. In this study 27

of the 58 participants attended pre-natal classes. The addition of topics, such as pelvic floor, abdominal, posture exercises, scar instruction, and body mechanics, should be added to classes with a trained health care provider facilitating the application of the information.

Finally, women in this study focused on cardiovascular exercises, such as walking, during the childbearing year when research has shown that strengthening of the pelvic floor, abdominal, and posture muscles are also important. Some authors feel that these essential exercises should be considered even before a cardiovascular program is implemented. Regardless, walking was by far the activity of choice for women during (77.6%) and after (68.4%) pregnancy. Some explanations for this include that women may assume walking is the only safe exercise, and walking is also convenient. The intensity or duration of walking was not addressed; therefore, it is not known if aerobic benefits were achieved or if instead the women considered walking at work or taking care of a toddler as exercise.

We also addressed numbers of months that women exercised and when the women started exercising after pregnancy. We feel that most women (mode= exercised all 9 months) continued with an exercise regime because the activities performed were mostly low impact. In addition, if the women made it six months, they were more likely to continue to perform the activity throughout the pregnancy. This exercise habit made it easier to start up again following childbirth.

The reader should consider that many of the conclusions in this study are trends, and the limited number of responses does not allow for projection of findings across the population. In addition, other limitations to consider include:

- 1) Women participating in this study tend to be the most compliant since we are surveying women who attend their advised six-week post partum check-up.
- 2) Only some doctors chose to participate in this study and therefore our findings do not represent each facility in its entirety.
- 3) There are few women who did not experience problems, and as a result, we were unable to compare our findings between those that did have problems and those that did not have problems.
- 4) There was a large population of women who exercised; therefore, we were unable to compare the exercisers to the nonexercisers.
- 5) Did women have sufficient knowledge of terms to respond to each question appropriately?

In summary, education of both women and health care providers, doctors in particular, is necessary for the referral of services that are proven effective for treatment of these common musculoskeletal conditions. Walking was a prevalent activity during both prepartum and postpartum phases, but essential exercises such as PF, abdominals, and posture should also be emphasized. Physical therapists should pursue advanced training in women's health issues and become involved in programming of classes and education. There is sufficient knowledge available on how to prevent and treat these conditions; women do not have to suffer.

The survey raised many questions regarding education and treatment of the six common musculoskeletal conditions of pregnancy. The methodology and survey of this study could be utilized as a template to conduct further research in women's health. It would be interesting to observe the outcome in a controlled study of women who are

trained in exercise (pelvic floor or abdominal, for example) by a professional compared to those who were provided only reading materials, which was a common occurrence in our survey. Variables such as strength and patient satisfaction could be analyzed. Also controlling key factors in a longitudinal study where women perform scar massage pre and post partum would be appropriate since there are very few studies to determine the exact massage prescription. Finally, a study to determine if there is a correlation between type of delivery and urinary incontinence.

Women's health is a vital, growing area of physical therapy necessary for the prevention and treatment of problems seen in women. The childbearing year is a time when the woman is susceptible to injury, and thus a time when dysfunctions could be prevented. This study, as well as many of the others mentioned, has shown the need for specialists to get involved in programming and education of health care providers and women.

APPENDIX A

EXPEDITED REVIEW REQUESTED UNDER ITEM \_\_\_\_\_ (NUMBER[S]) OF HHS REGULATIONS  
 EXEMPT REVIEW REQUESTED UNDER ITEM 2 (NUMBER[S]) OF HHS REGULATIONS

UNIVERSITY OF NORTH DAKOTA HUMAN SUBJECTS REVIEW FORM  
FOR NEW PROJECTS OR PROCEDURAL REVISIONS TO APPROVED  
PROJECTS INVOLVING HUMAN SUBJECTS

Please include ALL information and check ALL blanks that apply.

PRINCIPAL INVESTIGATOR: Tami Parker / Christel Parvey TELEPHONE: 787-5689 DATE: 6-23-00  
ADDRESS TO WHICH NOTICE OF APPROVAL SHOULD BE SENT: 1106 28 Ave S Apt 15, Grand Forks, ND 58201  
SCHOOL/COLLEGE: Medicine and Health DEPARTMENT: Physical Therapy PROJECT DATES: 7-5-00 — 10-30-  
(E.g., A&S, Medicine, EHD, etc.) (Month/Day/Year)  
PROJECT TITLE: "Determining the Need for Program Development for Women in Their Childbearing Years"

FUNDING AGENCIES (IF APPLICABLE): NA

TYPE OF PROJECT (Check ALL that apply):

NEW PROJECT  CONTINUATION  RENEWAL  DISSERTATION OR THESIS RESEARCH  STUDENT RESEARCH PROJECT  
 CHANGE IN PROCEDURE FOR A PREVIOUSLY APPROVED PROJECT

DISSERTATION/THESIS ADVISER, OR STUDENT ADVISER: Beverly Johnson, Associate Professor of Physical Therapy

PROPOSED PROJECT:  INVOLVES NEW DRUGS (IND)  INVOLVES NON-APPROVED USE OF DRUG  INVOLVES A COOPERATING INSTITUTION

IF ANY OF YOUR SUBJECTS FALL IN ANY OF THE FOLLOWING CLASSIFICATION, PLEASE INDICATE THE CLASSIFICATION(S):

MINORS (<18 YEARS)  PREGNANT WOMEN  MENTALLY DISABLED  FETUSES  PERSONS WITH  
 PRISONERS  ABORTUSES  UND STUDENTS (>18 YEARS)

IF YOUR PROJECT INVOLVES ANY HUMAN TISSUE, BODY FLUIDS, PATHOLOGICAL SPECIMENS, DONATED ORGANS, FETAL MATERIAL, OR PLACENTAL MATERIALS, CHECK HERE

IF YOUR PROJECT HAS BEEN WILL BE SUBMITTED TO ANOTHER INSTITUTIONAL REVIEW BOARD(S), PLEASE LIST NAME OF BOARD(S): \_\_\_\_\_

Status:  Submitted; Date \_\_\_\_\_  Approved; Date \_\_\_\_\_  Pending

1. ABSTRACT: (LIMIT TO 200 WORDS OR LESS AND INCLUDE JUSTIFICATION OR NECESSITY FOR USING HUMAN SUBJECTS.)

Acting as a clinician, educator, or consultant, physical therapists can offer a variety of services that would benefit women in their childbearing years. This population is frequently overlooked despite many prevalent problems associated with childbirth. In a study by Ostgaard and Andersson<sup>1</sup>, low back pain continued to be a problem in 37% of women 18 months following childbirth. Another study reports diastasis recti abdominis occurring as high as 67% during pregnancy and at a rate of 36% in a later postpartum group.<sup>2</sup> Stress urinary incontinence was experienced by 39% of a sample before, during, or after pregnancy<sup>3</sup> and the United States spent 11.2 billion dollars annually managing incontinence in these community dwellers.<sup>4</sup>

The purpose of this study is to develop an understanding of what interventions are currently offered in the Devils Lake and Grand Forks communities to pre and postpartum women and compare it to an ideal treatment protocol addressing pelvic floor muscles, abdominals, posture, scar mobilization, and the cardiovascular system. Our study will be accomplished via a survey and will provide direction for program development to benefit the health and wellness of women in their childbearing years.



- PLEASE NOTE:** Only information pertinent to your request to utilize human subjects in your project or activity should be included on this form. Where appropriate attach sections from your proposal (if seeking outside funding).
- 2. PROTOCOL:** (Describe procedures to which humans will be subjected. Use additional pages if necessary. Attach any surveys, tests, questionnaires, interview questions, examples of interview questions (if qualitative research), etc., the subjects will be asked to complete.)

Sample: All post partum women who are receiving postnatal care in the Grand Forks or Devils Lake regions and are over 18 years old may voluntarily participate and be included in this project.

The Instrument: A two-page survey will be given to the participants. This will include a cover letter explaining the benefits, criteria, guarantee of confidentiality, and a statement of voluntary participation to begin this survey. Patients will be given the names of health care professionals in physical therapy if concerns arise and wish to seek treatment. Also they will be encouraged to speak to their doctors on these issues.

University of North Dakota (UND) Physical Therapy students developed the questionnaire with the assistance of UND faculty, Associate Professor Bev Johnson and UND Instructor Cindy Flom-Meland. It was revised by three physical therapists actively working in women's health issues: Laurie Betting, Leatha Vaagen, and Megan Boyd. Finally, it is supported by local prominent physicians in this field (See attached letter.)

This survey requests information in both a quantitative and qualitative format. Data will include information and services acquired during and after pregnancy (See attached survey.)

The Procedure: The survey will be provided to the nurses of appropriate doctors who have approved this project. It will be handed out by the nurses at a woman's six-week appointment following childbirth and filled out while the client waits for her appointment. An enclosed envelope will be provided along with the survey. The patient is to seal the survey in the envelope and return it to the nurse or receptionist upon completion of the appointment to be stored in a file cabinet until picked up by the investigators. The sealed envelope will help guarantee confidentiality. The investigators will collect these surveys on a weekly basis for a period of 2-3 months.

Data Analysis: Traditional descriptive and analytical statistics will be used to assess the need for program development and assess awareness and compliance in women of childbearing years. We will use the information that is actually being provided to these women and compare it to an ideal or optimal program based on a literature review. Alpha for all tests will be set at .05.

Data Reporting: Results of this survey will be described in the Independent Study Report. Health care professionals can then utilize this information to develop programs and better address issues that are missed between professionals to better serve their patients. The report will be made available upon completion in the University of North Dakota Harley French Medical Library.

- 3. BENEFITS:** (Describe the benefits to the individual or society.)

The participants in this study will develop an increased awareness of women's health issues. The patients may be encouraged to speak to their doctors and seek treatment when problems arise.

Health care professionals will achieve a better understanding of what issues are not addressed due to the patients' lack of knowledge and services. Then they can provide direction for program development to benefit the health and wellness of women in their childbearing years.

All women can be benefited by receiving optimal care and information that may reduce and even prevent problems associated with childbirth. Furthermore health care professionals will be more educated and therefore will better serve the needs of their patients.

- 4. RISKS:** (Describe the risks to the subject and precautions that will be taken to minimize them. The concept of risk goes beyond physical risk and includes risks to the subject's dignity and self-respect, as well as psychological, emotional or behavioral risk. If data are collected which could prove harmful or embarrassing to the subject if associated with him or her, then describe the methods to be used to protect the confidentiality of data obtained, debriefing procedures, storage of data, how long data will be stored (must be a minimum of three years), final disposition of data, etc.)

The risks to those filling out the survey are minimal. We will assume to have the patient's consent if the survey is completed and returned because the survey is voluntary. There will be no identifying information on the survey. Storing the survey in a locked office for three years at the University of North Dakota will ensure confidentiality. The surveys will be destroyed following this three-year period.

5. **CONSENT FORM:** Attach a copy of the **CONSENT FORM** to be signed by the subject (if applicable) and/or any statement to be read to the subject should be attached to this form. If no **CONSENT FORM** is to be used, document the procedures to be used to assure that infringement upon the subject's rights will not occur.

Describe where signed consent forms will be kept and for how long (must be a minimum of 3 years), including plans for final disposition or destruction.

The risks to those filling out the survey are minimal. We will assume to have the patient's consent if the survey is completed and returned because the survey is voluntary. There will be no identifying information on the survey. Storing the survey in a lock office for three years at the University of North Dakota will ensure confidentiality. The surveys will be destroyed following this three-year period.

APPENDIX B

Table 4-20

*Handout for Pelvic Floor Exercises*

**Exercise #1: The Stop Test**

(Note: Advise women not do this first thing in the morning and to do only once a week as a test only.) Women with incontinence may have difficulty contracting the pelvic floor muscles in this gravity-resisted position.)

- Position:** Sit on the toilet. Spread legs apart for urination and support feet on a stool if voiding is difficult.
- Exercise:** As you urinate, stop and hold the flow of urine. Repeat a few times, breaking off the urine flow smoothly and completely. Try not to allow any dribbling of urine. Hold tightly for 5 seconds before starting urine flow again.
- Progression:** Let smaller amounts of urine pass each time. Do not worry if this difficult. Try to always end the voiding with an uplifting contraction of the pelvic floor.

**Exercise #2: Long Contractions**

- Position:** Lie on back or side with legs apart and chest relaxed.
- Exercise:** Draw pelvic floor upward. Feel the squeeze as the sphincters are tightened, and the inside passage becomes narrow and tense. Focus on the front portion of the pelvic floor where the master sphincter surrounds the vagina and urethra. Initially, hold 10 seconds and then completely relax. Attempt to relax a little bit more, releasing any residual tension. Repeat 2 or 3 times, relaxing and repeating. Always end with a contraction.
- Progression:** Try other positions such as sitting, standing, and squatting. Do a total of 50 repetitions a day: 10 repetitions at a time, 5 sessions per day, holding each repetitions for 10 seconds. Relax between each contraction.

**Exercise #3: Quick Contraction**

- Position:** Lie on back or side with legs apart and chest relaxed.
- Exercise:** Draw pelvic floor upward. Feel the squeeze as the sphincters are tightened, and the inside passage becomes narrow and tense. Focus on the front portion of the pelvic floor where the master sphincter surrounds the vagina and urethra. Initially, hold 2-3 seconds and then completely relax. Attempt to relax a little bit more, releasing any residual tension. Repeat 2 or 3 times, relaxing and repeating. Always end with a contraction.
- Progression:** Try other positions such as sitting, standing, and squatting. Do a total of 50 repetitions a day: 10 repetitions at a time, 5 sessions per day, holding each repetitions for 3 seconds. Relax between each contraction.

**Exercise #4: The Elevator**

- Position:** Assume any position, although lying down is easier at first.
- Exercise:** Imagine you are in an elevator on the first floor. As you ascend to each floor, draw up the pelvic floor muscles a little bit more. When you reach your limit, do not let go, but descend floor by floor, gradually relaxing the pelvic floor in stages. When you have reached the first floor, think about releasing, and continue to the basement. Do not hold your breath, blow out through pursed lips. Feel the perineal muscles bulge. Complete this exercise by bringing the pelvic floor back up to the ground floor.

**Exercise #5: The Sexercise**

- Position:** Assume any position of coitus with the legs spread apart and relaxed.
- Exercise:** Grip the penis as firmly as you can with your vagina, holding for 5 seconds before you relax. Try to avoid tensing the buttocks and the abdominal muscles. Repeat a few times until your partner tells you the strength of the contractions has diminished. Rest and repeat in a few minutes.
- Progression:** Your muscle strength will increase as you learn to make the contractions stronger, more consistent and more numerous.

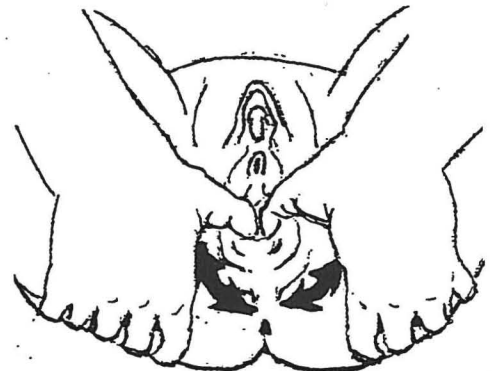
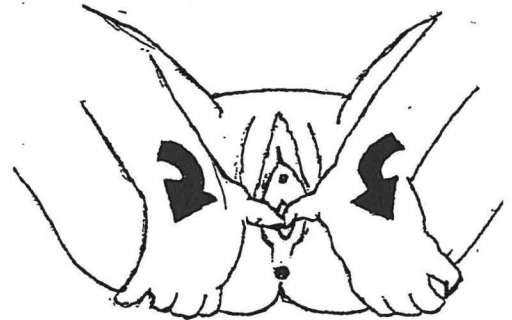
[Adapted from E. Noble. *Essential Exercises for the Childbearing Year*<sup>38</sup>]

APPENDIX C

## Perineal Massage Techniques

Massaging the perineum (skin around the vaginal opening) daily for the last 6 weeks of pregnancy may help avoid the need for an episiotomy and/or prevent tearing during delivery. This technique gradually stretches the vaginal and perineal tissues, rather than expecting them to respond to an intense stretch during delivery. It is also helpful to learn to strengthen and relax your pelvic floor muscles by doing Kegel (or pelvic floor) exercises throughout you pregnancy.

1. The massage should be done daily for 5-10 minutes, starting about six weeks (or 34 weeks gestation) before your due date
2. Make sure your bladder is empty and that you are propped up comfortably. A warm bath may help you relax and soften your perineum. Use a mirror the first few times until you become familiar with the area you are massaging.
3. Massage a natural oil (wheat germ oil, olive oil, or plain salad oil) into the tissues of the perineum and just inside the vagina. Pay special attention to any scar tissue from past episiotomies or tears.
4. Put your thumbs (or have your partner put both index fingers) about 2 inches into vagina and press downward toward the rectum. While maintaining gentle, steady pressure, the fingers should move upward along the sides of the vagina, in a rhythmic "U" movement. Avoid rubbing the urinary opening located directly above vagina.
5. As you massage each day, your tissues should relax and stretch. Gently stretch vaginal opening as wide as possible each session. You should feel a slight tingling or burning sensation, which will also mimic the feeling of the baby's head beginning to crown.
6. Hold this painfree stretch for 45-60 seconds and then release. Massage with more oil and repeat the stretch one more time.



APPENDIX D

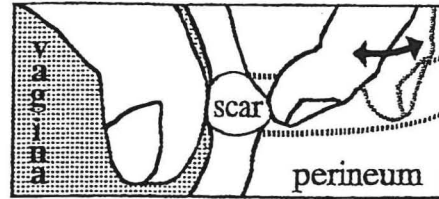
## How To Massage

Within five to ten days the stitches will dissolve. Once this happens, you can begin to massage the tissues between the vagina and anus. Insert your thumb into your vagina while keeping the index finger over the perineal body above the scar. Gently roll the tissue between thumb and finger. Use a warm compress to get started. This will relax the muscles and allow you to touch yourself with less discomfort.

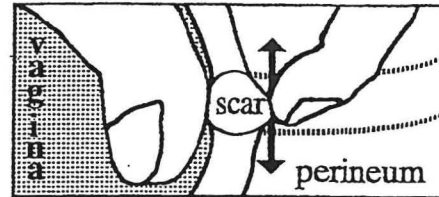
**TIP: Scar tissue? Anus? Vagina? Stick your thumb in? If you find this embarrassing, read it twice! The muscles in this region are crucial to your health and well being . They support your internal organs, play a role in sexual function, and maintain continence of both bladder and bowel. Learn to touch, look at, move, and think about this part of your body. It will help you heal faster and stay healthier.**

**You can massage the scar tissue from an episiotomy or tear in three directions.**

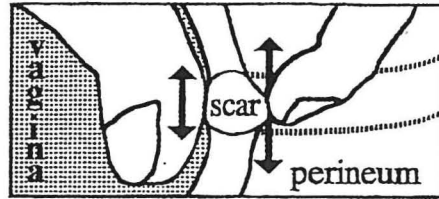
With the grain (working along the line of the scar).



Against the grain (working across the scar).



By rolling the scar between the thumb and forefinger.



As the scar is massaged it will become smaller, more elastic, and less tender. This permits the tissues of the muscles to regain their function without getting stuck to one another and it reduces the interference of thick masses of scar tissue.

If scar tissue has adhered and is causing discomfort during intercourse, you should have a medical practitioner, either an ob/gyn, a midwife, or a physical therapist specializing in women's health, evaluate your condition. They will help you learn self-massage and will be able to apply deep heating ultrasound to the affected area. (This is not the same ultrasound used to view your baby inside you.) Four or five ultrasound treatments coupled with massage will often make the scarred area painless to the touch and intercourse less uncomfortable.

Pirie A, Herman H. How To Raise Children Without Breaking Your Back. IBIS Publications PO Box 441474 Somerville, MA 02144. 1995



## **Scar Mobilization**

An incision long enough to accommodate your baby leaves a long scar. Even if the scar is low on your belly and scarcely visible, it could use some attention from you. Scar mobilization means just what it sounds like, moving the scar tissue around using simple massage techniques.

### **Why Do It?**

Once your incision is healed, it's important to prevent the scar tissue from adhering to the muscle layers deeper inside. Remember that your incision penetrated all the way through skin, muscles, and uterus. Scar tissue can be quite deep.

### **When To Begin**

You can begin to lightly massage your scar as soon as the incision has healed and the staples or stitches are out. Be gentle when you first begin, and if you feel any discomfort, stop and be much gentler. Your eventual goal is to move the skin and the muscles underneath so that they seem to slide freely over one another.

In most cases scar tissue and its tendency to adhere to muscle, can be dealt with by you. Your scar can be lifted and separated from healthy muscle tissue to reduce or eliminate adhesion. This scar mobilization will actually reduce the amount of scar tissue. As you loosen the scar, it may also take away any feelings that you have of pinching or pulling your lower belly as you reach for things on a high shelf.

There is no final time limit for working on scars. You can begin two years after a cesarean or episiotomy and still make the scar softer, thinner, and less visible.

### **How To Do It**

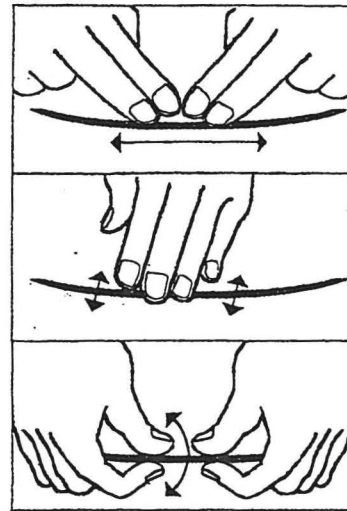
Some people are reluctant to touch the scar or even the whole general area of the incision. If you feel this way, begin by lightly touching and stroking yourself, first with your palms and then with your fingertips. If this is too hard, begin by using a soft, clean cloth. Use a mirror to closely examine your scar. Nobody is going to be gentler or more thoughtful about your healing than you yourself.

Begin scar mobilization by rubbing your hands together to warm them up. You can use warm compresses or neutral oils, if they make you more comfortable or make the massage pleasanter, but they aren't necessary. If oil appeals to you, use a little, but don't make the skin so slippery that you can't get a good hold on the scar tissue.

Massage the scar tissue by working it with a rubbing motion along the grain (along the line of the scar).

Stroke back and forth against the grain (across the scar).

Roll the scar between your thumb and your forefinger.



To get the maximum benefit, the massage should be done 2-3 times a day for 5-10 minutes at a time. The more you massage the scar, the more pliable, soft, thin, and cosmetically appealing it will become. Don't rub so hard that it hurts. At the end, hold the ends of the scar. Gently push and pull it back and forth and from side to side for a minute or two. You can expect to feel and see results in three to four weeks. Don't worry about not always doing the full time, every little bit will help.

Pirie A, Herman H. How To Raise Children Without Breaking Your Back. IBIS Publications PO Box 441474 Somerville, MA 02144. 1995

APPENDIX E

## American College of Obstetricians and Gynecologists (ACOG) Recommendations for Exercise in Pregnancy and Postpartum

- During pregnancy, women can continue to exercise and derive health benefits even from mild to moderate exercise routines. Regular exercise (at least 3 times per week) is preferable to intermittent activity.
- Women should avoid exercise in the supine position after the first trimester. Such a position is associated with decreased cardiac output in most pregnant women. Because the remaining cardiac output will be preferentially distributed away from splanchnic beds (including the uterus) during vigorous exercise, such regimens are best avoided during pregnancy. Prolonged periods of motionless standing should also be avoided.
- Women should be aware of the decreased oxygen available for aerobic exercise during pregnancy. They should be encouraged to modify the intensity of their exercise according to maternal symptoms. Pregnant women should stop exercising when fatigued and not exercise to exhaustion. Weight-bearing exercises may under some circumstances be continued at intensities similar to those prior to pregnancy throughout pregnancy. Non-weight bearing exercises, such as cycling or swimming, will minimize the risk of injury and facilitate the continuation of exercise during pregnancy.
- Morphologic changes in pregnancy should serve as a relative contraindication to types of exercise in which loss of balance could be detrimental to maternal and fetal well-being, especially in the third trimester. Further, any type of exercise involving the potential for even mild abdominal trauma should be avoided.
- Pregnancy requires an additional 300 kcal/day to maintain metabolic homeostasis. Thus, women who exercise during pregnancy should be particularly careful to ensure an adequate diet.
- Pregnant women who exercise in the first trimester should augment heat dissipation by ensuring adequate hydration, appropriate clothing, and optimal environmental surroundings during exercise.
- Many of the physiologic and morphologic changes of pregnancy persist 4 to 6 weeks postpartum. Thus, prepregnancy exercise routines should be resumed gradually based on a woman's physical capability.

*ACOG Technical Bulletin 189*<sup>40</sup>.

APPENDIX F

Dear Patient:

We, Tami Parker and Christel Parvey, physical therapy students at the University of North Dakota are conducting a survey on the available services and information provided to you throughout your pregnancy. As women in the childbearing years, we were hoping you might provide some assistance for our enclosed survey. This survey will provide us information regarding the awareness of women on various issues related to pregnancy and the services needed and utilized. Our intent is to advance awareness in women's health issues and provide direction for program development to benefit the health and wellness of women in their childbearing years. This information will be used in our graduate project in Physical Therapy at the University of North Dakota.

We would like to invite you to voluntarily complete this survey. Criteria includes that you have given birth within the last six months and are over 18 years of age. The survey should take approximately four to eight minutes to complete and when finished, seal it in the envelope provided to you. No identifying information is on your survey, therefore results reported will be completely confidential. Please return this sealed envelope to your nurse or front desk receptionist when finished.

This project will benefit both health care professionals and you as consumer of these services. By gaining awareness, we hope you feel that you can discuss some of these issues with your doctors or seek treatment for these conditions (including low back pain or dribbling urine). In addition, health care professionals will achieve a better understanding of what issues are not addressed and need to be.

Regardless of your participation or lack of participation in this study, it will not affect your relationship with the clinic facility or the University of North Dakota. If you have questions, please feel free to discuss these issues with your doctor. In addition, there are local physical therapists that are qualified and treat women with some of these same problems.

Laurie Betting, MPT	Healthsouth Grand Forks, ND
Leatha Vaagen, MPT	Healthsouth Devils Lake, ND
Megan Boyd, MPT	Altru Health Institute Grand Forks, ND

Thank you for your time and cooperation.

Sincerely,

Tami Parker and Christel Parvey  
Graduate Physical Therapy Students  
University of North Dakota

Today's Date: \_\_\_\_\_

Your Age: \_\_\_\_\_

1) Where did you receive your prenatal/postnatal care?

- Altru Family Medicine Center, Grand Forks
- Altru Main Clinic OBGYN, Grand Forks
- UND Family Practice, Grand Forks
- Lake Region Clinic, Devils Lake
- Other \_\_\_\_\_

2) Number of full term pregnancies: \_\_\_\_\_ Age of children: \_\_\_\_\_

Have you had any of the following (if yes, indicate **how many**):

- miscarriages \_\_\_\_\_
- episiotomies \_\_\_\_\_
- vaginal deliveries \_\_\_\_\_
- cesarean births \_\_\_\_\_

3) Have you experienced or had any of the following:

Weak abdominal muscles      Yes    No  
                                                                        If yes, did you seek treatment? Y / N  
 Explain \_\_\_\_\_

Low back pain

- a) During pregnancy            If yes, did you seek treatment? Y / N
- b) After childbirth              Explain \_\_\_\_\_

Leaking urine

- a) when coughing/  
sneezing/lifting  
heavy objects/running?            If yes, did you seek treatment? Y / N  
Explain \_\_\_\_\_

- b) when unable to get  
to the bathroom in time            \_\_\_\_\_

Pain with intercourse              If yes, did you seek treatment? Y / N  
Explain \_\_\_\_\_

4) Which activities did you perform **during** and **after** pregnancy? (Please check **all** that apply.)  
If you exercised occasionally, please specify how many times **per month**.

Activity	DURING: # of times/week	AFTER: # of times/week
Walking		
Biking		
Swimming		
Aerobics		
Running		
Weight Lifting		
Other:		
I did not exercise:	<input type="checkbox"/> During pregnancy	<input type="checkbox"/> After pregnancy

5) How many months of your pregnancy did you exercise? \_\_\_\_\_

6) If you are exercising, how soon did you start *after* childbirth? \_\_\_\_\_

7) Did you receive information on exercise guidelines *during* pregnancy?  
(If yes, check *all* that apply.)

MD=Doctor	NP=Nurse Practitioner	N=Nurse	PT=Physical Therapist
ExC=Exercise Class	PreC=Prenatal Class	Books=All reading materials	

	<u>MD</u>	<u>NP</u>	<u>N</u>	<u>PT</u>	<u>ExC</u>	<u>PreC</u>	<u>Books</u>
Y / N <b>How hard/how often to exercise</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Y / N <b>Pelvic floor exercises</b> (Kegel's)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Y / N <b>Scar massage/mobility</b> (for prevention of tears/episiotomies)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Y / N <b>Breathing techniques</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Y / N <b>Physical changes</b> (balance, posture, joint instability)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8) Did you receive information on exercise guidelines *after* childbirth?  
(If yes, check *all* that apply.)

	<u>MD</u>	<u>NP</u>	<u>N</u>	<u>PT</u>	<u>ExC</u>	<u>PreC</u>	<u>Books</u>
Y / N <b>How hard/how often to exercise</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Y / N <b>Pelvic floor exercises</b> (Kegel's)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Y / N <b>Scar massage/mobility</b> (Applicable if tear/episiotomy/cesarean)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Y / N <b>Correct Lifting Techniques</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9) Please specify what types of classes you attended? \_\_\_\_\_

10) What information do you feel was the most beneficial? \_\_\_\_\_

11) What else might have been helpful? \_\_\_\_\_

12) Do you perform scar massage/mobility? Y / N      If yes, how often?  
 0-1 times/week    2-4    5-7    I occasionally perform but not on a regular basis

13) Do you perform pelvic floor exercises (Kegel's)?      Y / N (If yes, complete a-c)  
 a) When did or do you perform these exercises?  
 During Pregnancy       After Pregnancy       Both  
 b) How often?  
 1-9 times/day    10-20    25-40    50-65    80+  
 I occasionally perform these exercises but not on a regular basis  
 c) Did you feel these exercises are beneficial? Why or why not \_\_\_\_\_

APPENDIX G



## SURVEY COMMENTS

### 1) Was Treatment Sought for Problems Identified? \*

(\*Although many women made comments in the treatment section provided, few women actually selected yes to receiving treatment.)

#### a) Problem: Weak Abdominal Muscles

"This last delivery"

"Yes, nothing could be done."

"Yes, physical therapy for one month. Pelvic bone shifting"

#### b) Problem: Low Back Pain During and/or After Pregnancy

"Just at the end of pregnancy and the first week after exercise"

"Physical therapy and chiropractor adjustments for sciatica"

"Just during the first pregnancy"

"It came with my blood clot."

"Discussed with Doctor"

"One session with a PT to learn some stretches"

"No need pain was normal"

"Back labor both pregnancies"

"Tylenol"

"Pulled muscle (massage and cool/warm pack at home)"

"My husband is a PT and had a yoga video that showed various positions to relieve pain"

"Took aspirin during pregnancy and now also"

"Offered therapy which didn't help"

"Tylenol takes the pain away."

"No treatment sought, but not that serious."

"Yes sought treatment with the first child. PT and Chiropractor"

"Sought treatment at GFAFB Physical Therapy for back manipulation."

"Yes, pain killers"

"No treatment sought. LBP due to injury after birth."

"Chiropractor"

"Not severe enough to seek treatment"

#### c) Problem: Leaking Urine (Stress and/or Urge Incontinence)

"When sneezing at the end of pregnancy"

"Kegel exercises are helping"

"While pregnant (time will tell if it goes away. So far no problem ?sneezing)"

"Some leak with sneezing (cross legs when sneeze)"

"I'm trying the Kegel exercises. If they don't work I'll seek treatment."

"Told to do Kegel exercises which did not help"

"Part of life"

"I'd read enough to know that this is fairly common in early weeks following pregnancy. The type b (urge) leakage only occurred twice in the first week after birth. I've been trying to do some Kegel exercises and the type a (stress) leakage is now quite rare for me."

**d) Problem: Pain with Intercourse**

"After both pregnancies up to 6 months after birth and during 2<sup>nd</sup> pregnancy"

"Doctor just kept telling me to wait or quit having sex. Was not at all helpful."

"Follow-up check up if continues."

"Yes painful intercourse. Haven't sought treatment yet but I will at my next gyn appointment."

"Not yet. Want to give myself a little more time to heal."

"Yes, talked to doctor at 6 weeks. Check-up for recommendations."

**2) Other Exercise**

Exercise

Stretching

Physical therapy daily

Volleyball (once awhile for the first trimester only)

Stair stepper

Nordic Track

Softball

Figure skating

Rollerblading

Rollerblading

Abdominal exercises

Tae Bo

Active mom of a toddler (was most of my exercise)

Active mom (chasing 5 year old and 19 month old infant enough for now; I bounce back to pre weight easily)

**3) What Information Do You Feel is Most Beneficial?**

"Labor preparation"

"The refresher labor and delivery course"

"Breathing and Pushing Instructions"

"Lamaze"

"Lamaze"

"Lamaze"

"All classes were really helpful especially prenatal."

"Knowing what to expect during and after labor"

"What to expect upon arrival when in labor"

"What to expect"

"Correct breathing techniques"

"Breathing techniques"

"Breathing techniques"

"Breathing"

"Breathing techniques and drug info"

"Breathing techniques and pain management in labor"

"Breathing"

"Breathing techniques"  
 "Breathing and relaxing techniques"  
 "Relaxation techniques"  
 "Breastfeeding information"  
 "Breastfeeding while in hospital"  
 "Breastfeeding"  
 "How to breastfeed since that was very important to me."  
 "Bathing your baby"  
 "Kegels"  
 "The most helpful information I got was from books."  
 "Books"  
 "Posture"  
 "MD information"  
 "MD information on food restrictions that aided in retaining my prepregnancy shape and size."  
 "Pain control options"  
 "All, sought PT for back manipulation"  
 "Everything"  
 "All of it"  
 "All of it"  
 "All of it"  
 "All of it was very helpful to me being a first time mother."  
 "Everything"  
 "All info"

#### 4) What Else May Have Been Helpful?

"In Lamaze class, there should be more information on recovery after vaginal birth."  
 "Talking to more moms"  
 "Since the survey brought it up, I realized that more can be discussed regarding exercise pre and post."  
 "Don't know"  
 "Day by Day book"  
 "Yoga for pregnancy (Gives breathing and concentrating techniques, balancing and strength position, how to relieve low back pains, etc.) I strongly recommend a class for this."  
 "More on breastfeeding"  
 "More info on life after the birth"  
 "Having a MD sensitive to mood and emotional changes during pregnancy. Depression is very real and very serious- it can lead to much emotional pain and can be harmful and even fatal!! It's too easy for doctors to tell you it's hormones and send you home even if you are telling them you are seriously depressed."  
 "Talking with my doctor about episiotomies before I tore during childbirth."  
 "I feel exercise is very important and I wish I would've had more information on it."

"More info on how and when to know you're in labor."  
"A full time cleaning lady/cook the first month. Seriously, I wish someone would have emphasized it more how to take it easy the first month, and everything changes after that-you feel better and the baby feels better, etc."  
"Scar massage"  
"Someone to exercise with"  
"Back manipulations twice a week"  
"More books"  
"After c-section to know when can exercise and have intercourse"  
"Covered everything very well"

**5) Do You Feel Pelvic Floor Exercises are Beneficial? (why or why not):**

"Yes, it strengthens the muscles."  
"Yes, strengthen pelvic muscles"  
"Yes, it helped me strengthen for child birth and after birth also."  
"Yes, they strengthen pelvic floor muscles and decrease leakage."  
"Yes, it helped me with my leaking urine problems."  
"Yes, my leakage is very rare now and would probably go away if I did them more regularly."  
"Yes, I need to be more disciplined, the Kegels for me are for bladder control."  
"Yes I haven't had any leaking of urine."  
"Yes it did help bladder wise."  
"Yes, helped with bladder control"  
"Yes, they strengthen pelvic floor muscles and decrease leakage."  
"Yes, I did not have any bladder control problems during or after pregnancy."  
"Yes, to tighten the vaginal walls back up"  
"Yes, helped with pushing during labor"  
"Yes, got me ready for delivery. I healed quicker and was back on my feet in no time."  
"Yes, healthy in shape"  
"Yes, it relieved pressure."  
"No, they don't seem to help control bladder function to any great degree"  
"I haven't done them enough to give a good answer"  
"Could have been"  
"I don't know- first pregnancy"  
"I didn't do them enough to benefit from them"  
"Not sure since I don't do them regularly"  
"I guess but not really sure because I don't know what it would have been like if I didn't do them."  
"I think so."  
"Couldn't tell"

**6) Other Comments Regarding Various Aspects of Survey:**

**a) Regarding Information received:**

"Staff figured I knew it (information) already. I think it is good to be reminded though."

"Correct lifting techniques already learned through work."

"Information received (How hard/ How often, PF, Breathing techniques, Physical changes) from yoga video"

"Was given brochure when mentioned PF problems to doctor (with no coaching)."

"I have never heard about it (scar massage). I wish I knew about it."

"All information (breathing techniques) from prenatal class. My instructor was great."

"Information from MD (but only because I asked)."

"Never heard of it (scar massage)"

**b) Regarding Exercise During Pregnancy:**

"Only exercise periodically (don't have enough time now)"

"Running (5x's/wk) in the first few months"

"On bed rest"

**c) Do you Perform Pelvic Floor Exercises?**

"No but I should I suppose even though I had a c-section."

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