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**THE EFFECTS OF A PRE-OPERATIVE EDUCATION PROGRAM
ON ANXIETY AND CORTISOL LEVELS PRIOR TO
AND FOLLOWING SURGERY**

by
Lou Ann Balducci

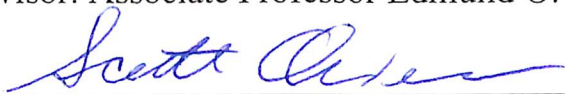
A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of
the requirements of the Sally McDonnell Barksdale Honors College.

Oxford
May 2006

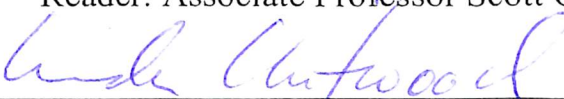
Approved by



Advisor: Associate Professor Edmund O. Acevedo



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ABSTRACT

LOU ANN BALDUCCI: The Effects of a Pre-operative Education Program on Anxiety and Cortisol Levels Prior to and Following Surgery (Under the direction of Dr. Edmund O. Acevedo)

Evidence suggests that lower levels of stress may negatively impact the healing process and tissue repair after surgery. The purpose of the investigation was to assess the effectiveness of a pre-operative educational program on reducing pre-operative and post-operative anxiety levels for patients having orthopedic surgery. Three subjects volunteered to participate in this study. The State Anxiety Inventory, Hospital Anxiety and Depression Scale, and Perceived Stress Scale questionnaires all showed that Subject 1 (treatment subject) did not have the highest anxiety or stress levels. In addition, cortisol levels were lower in Subject 1. Furthermore, Subject 1 was the most confident in the physician and health care providers. Conversely, Subject 1 also reported being the most upset about her surgery. Future research assessing the use of pre-operative education on reducing anxiety and cortisol levels prior to and following surgery is warranted. A more valid examination of the benefits of the pre-operative educational information should include a greater number of subjects and patients who have not been exposed to any type of surgery or been in a hospital environment. As Spalding suggests, the ultimate goal of pre-operative education is “making the unknown familiar” (Spalding, 2003).

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INTRODUCTION

Identifying an anatomical or physiological explanation to an injury might seem to be one of the most crucial landmarks along the way to a patient's healing, however the healing process is vastly more complex than it might appear. Once a diagnosis is made, a surgery, if necessary, can be scheduled. A surgery can be completed flawlessly, yet the patient's journey to recovery has still only just begun. Orthopedic surgery, whether miniscule or massive, requires physical therapy and proper healing of the human body. A physical therapist's role is to help alleviate pain and prevent the onset and progression of impairment, functional limitation, disability, or negative changes in physical function and health status. Physical therapists also help to restore, maintain, and promote overall fitness, health, and optimal quality of life (APTA, 1998). The therapist's goal for a particular patient is to reduce pain and return to independence in performing all activities of daily living.

Healing requires far more than just physical improvements. In addition to the physical impairments of the patient (i.e. decreased range of motion, decreased strength, difficulty walking, pain), many patients following surgery or injury also exhibit psychological responses such as stress and anxiety that may negatively impact their recovery and delay the healing process. Anxiety can be the response to, or cause of, stress, which is a bio-physiological event. Anxiety is the individual's subjective emotional response (Kapnoullas, 1988). Studies have shown that patients demonstrate an

increased level of anxiety prior to a surgical procedure. Anger, frustration, anxiety, and depression are several psychological responses that consistently appear in individuals after an injury (Pearson & Jones, 1992). According to numerous studies, individuals who experience stress after an injury or before surgery have a delayed healing response (Boore et al, 1987; Norman, 2003; Kiecolt-Glaser, Marucha 1995; Glaser, 1999). Under stressful situations, cortisol is released in order to exert regulatory control over stress-related processes that would otherwise be detrimental to the human body. Cortisol, a biological marker of hypothalamic-pituitary-adrenal axis (HPA) activity, is used in research as an index of distress (Schmidt, 1998). Prolonged tissue repair and healing can be due partially to the elevated cortisol levels and the inhibition of other immune system responses often exhibited in those individuals with increased stress levels, especially after a life altering event like a major injury or surgery (Worley, 2004). Stress may increase the secretion of vasoactive substances and hormones such as epinephrine, norepinehrine, and cortisol, resulting in vasoconstriction and decreased nutrient and oxygen supply. Tissue repair and healing is heavily dependent on the initial inflammatory response. Stress causes a delay in the initiation of the inflammatory response due to increased levels of cortisol, which inhibits cellular migration. The result can be a longer healing time (Norman, 2003; Kiecolt-Glaser and Marucha, 1995; Glaser, 1999).

Pre-operative education has been used to reduce anxiety levels and help patients prepare psychologically and physically for the impending surgery and for the recovery that follows. Studies have shown that pre-operative education programs help to reduce an individual's anxiety prior to surgery (Spalding, 2003). However, the physiological response to the reduced anxiety has not yet been investigated.

The purpose of the present investigation was to assess the effectiveness of a pre-operative educational program on reducing pre-operative and post-operative anxiety levels for patients having surgery. Stress levels before and after the educational program was determined by measuring self-report anxiety and salivary cortisol levels. It was hypothesized that participation in a pre-operative education program would result in decreased levels of anxiety and cortisol prior to and after surgery, thereby reflecting a lower level of stress concerning the surgery and recovery. As a result of the lower levels of stress, the healing response and tissue repair after surgery will likely be facilitated.

CHAPTER I: LITERATURE REVIEW

Thousands of patients undergo surgical procedures daily. Most of these surgeries will require rehabilitation of some type after surgery in order to regain function. The awareness of psychological factors has been continually increasing in therapy-related literature. These psychological factors have been shown to be directly linked to the patient's adjustments during recovery. Stage approaches have been utilized to help explain these psychological responses. The most widely accepted stage theory is the Kubler-Ross "loss of health" or "grief" model. Denial, anger, bargaining, depression, and acceptance are all stages in this model (Kubler-Ross, 1969). Athletes have exhibited these psychological responses during the recovery process (Gordon, Milios, and Grove 1991, 1992). Hospitalized patients prior to surgical procedures have also demonstrated these psychological responses (Krause, 1987; Teasdale, 1987). Studies have shown individuals awaiting surgery demonstrate the coping strategies of denial, aggression, and regression, and if allowed to continue up to the time of surgery, these strategies may result in poor post-operative adjustment. The result could be greater perceived fear, a reduction in self-esteem, and even a prolonged recovery.

One of the most common psychological responses in patients awaiting an impending surgery is anxiety. Anxiety has been defined as "fear of the unknown, as disproportionate to the threat involved and directly related to the future events in the life of the individual" (Wilson-Barnett, 1981). It may be persistent and frequent in nature but

also may be experienced as a rare emotion. Patients hospitalized for surgical procedures have been shown to have higher anxiety levels than other medical patients (Caunt, 1992; Dobree, 1990; Radcliffe, 1993; Garretson, 2004). Anxiety is a product of helplessness, and admission to the hospital heightens this anxiety by disturbing the patient's independence outside the context of their normal lives. According to a study by Cochran (1984), hospitalization, regardless of disease or purpose, provokes a psychological response, including increased stress levels. This is particularly relevant for patients awaiting surgery and hospitalization, since anxiety has been shown to be one of the most common reactions to illness and changes in health (Wilson, 1981).

Studies have shown that patients who are in good physical health but who require admission to the hospital for surgery exhibit higher levels of anxiety than those who are ill at admission (Cochran, 1984). Those who are ill before admission to the hospital are generally relieved to be receiving treatment to ease their symptoms, although they may be unfamiliar with hospitals. However, the healthy patient may demonstrate increased stress levels due to being preoccupied with the new and potentially threatening aspects of the experience. Patients who are physically healthy prior to admission are usually patients choosing to have elective surgery or those patients who are unexpectedly injured and require subsequent surgery. Frequently, these patients demonstrate such a high level of anxiety that they develop physiological symptoms such as nausea, diarrhea, malnutrition, and sleeplessness.

When facing surgery, the patient is subjected to a variety of stresses associated with anxiety. These stresses include fear of pain, loss of independence, alterations in body image, possible unknown diagnostic results, and perhaps even loss of life, all of

which may be seen as a posing threat (Wilson-Barnett, 1981; Castledine, 1988). Patients often become apprehensive and dread the impending surgery, two prominent features of anxiety (Kenworthy et al, 1992). This emphasizes a statement made by Autton: “There is no such thing as a minor operation to a patient” (Autton, 1968).

Numerous factors contribute to the anxiety before a surgical procedure. Several factors include previous surgical experience, if any, previous hospitalizations, if any, and a lack of knowledge about the procedure, the facility/hospital, the staff, and the recovery after surgery. All of these factors may inhibit communication and result in limited understanding of events (Davis, 1972; McGilloway, 1979). Together these factors produce social stress as the patient experiences frustration, which prevents action to gain the appropriate information (Groen, 1971).

Anxiety, if unrecognized, may subsequently harm the patient and delay recovery (Kempe and Gelazis, 1985). Boore et al (1987) reported that prolonged anxiety leads to increased protein breakdown, decreased wound healing, decreased immune response, increased risk of infection, and increased risk of fluid and electrolyte imbalances. The literature has shown that physiological and psychological stresses are cofactors in tissue healing and recovery. According to Worley (2004), stress directly affects the corticosteroid levels and stimulation of the sympathetic nervous system. Stress may increase the secretion of vasoactive substances and hormones such as epinephrine, norepinehrine, and cortisol, resulting in vasoconstriction and decreased nutrient and oxygen supply. Tissue repair and healing is heavily dependent on the initial inflammatory response. Stress causes a delay in the initiation of the inflammatory response due to increased levels of cortisol, which inhibits cellular migration. The result

can be a slower healing time (Norman, 2003; Kiecolt-Glaser and Marucha, 1995; Glaser, 1999).

Recovery can be delayed also by an inhibition of the immune system caused by the stress hormones. Catecholamines have been shown to severely elevate the number and activity of natural killer cells due to the expression of beta-adrenergic receptors on natural killer cells; however, this can be overridden by elevations in cortisol. Cortisol suppresses the immune system by killing T helper cells, thus limiting the appropriate immune responses of cytotoxic cells (Shedlowski, Jacobs, Statmann, et al, 1993; Nomoto, Karasawa, Uehara, 1994; Kronfol, Nair, Zhang, et al, 1997; Kronfol, Starkman, Schteingart, et al, 1996).

To avoid the negative effects that anxiety can have on a patient awaiting surgery, healthcare professionals can intervene to decrease the patient's stress level. Health professionals can try to reduce anxiety by addressing the patients' psychological as well as physical needs. Numerous studies have shown that patients benefit from psychological preparation for surgery and that pre-operative information not only helps to decrease anxiety but also can help to decrease post-operative pain, reduce length of stay, and increase patient satisfaction (Garretson, 2004). Additionally, there is evidence that when pre-operative information is given, infection rates fall (Egbert, et al, 1964; Martin, 1996). In a study by Wong (1990), patients who underwent cardiothoracic surgery recovered better and had less post-operative hypertension when they had received pre-operative information. In a study of elective intensive care unit patients by Lynn-McHale et al (1997), 92% felt a pre-operative tour of the unit was beneficial in alleviating anxiety. In a study by Hathway (1986), in which he reviewed 68 experimental studies utilizing

pre-operative education, there was a 20% improvement in post-operative outcomes, including a reduction in stress levels. The reduced incidence of physical and psychological problems during the patients' rehabilitation in the hospital was used to infer the effectiveness of the pre-operative education.

Spalding (2003) suggests that pre-operative information is beneficial in decreasing anxiety because it gives patients an idea of what to expect. Patients gain knowledge about the surgical procedure, the healthcare professionals who will be caring for them, the facility where the surgery will occur, where they will be recovering afterwards, and the rehabilitation that follows if applicable. Additionally, the patient receives knowledge about what to expect the day of surgery, such as the admission process, the location of the waiting area for family, transportation home (if outpatient surgery), and various tests including blood draws. The pre-operative education is a way of "making the unknown familiar" (Spalding, 2003).

The benefits of pre-operative education have been documented many times in therapy-related literature. Researchers have correlated pain experience and reduced analgesia usage with pre-operative education (Worley, 1986; Orr, 1990; Shade, 1992; Spalding, 1995; Gammon and Mulholland, 1996; Daltroy, et al, 1998). Other researchers have utilized various psychological anxiety measures such as the Hospital Anxiety and Depression Scale and Spielberger's State Trait and Anxiety Inventory (Bondy, et al, 1999). Reduced anxiety has been attributed to patient education with each of these measures. However, only one study has examined cortisol levels as a measure of a patient's physiological stress. Under stressful situations, cortisol is released in order to exert regulatory control over stress-related processes that would otherwise be detrimental

to the human body. Cortisol, a biological marker of hypothalamic-pituitary-adrenal axis (HPA) activity, is used in research as an index of distress (Schmidt, 1998). Pearson, Maddern, and Fitridge (2005) measured cortisol and examined the associations between (1) heightened pre-operative state-anxiety and intra-operative neuroendocrine responses (cortisol elevations), (2) neuroendocrine responses and complications, and (3) heightened pre-operative state-anxiety and post-operative recovery. Results from this study showed increasing pre-operative anxiety to be associated with lower intra-operative cortisol responses and poorer mental functioning one month following surgery.

Psychological responses demonstrated prior to an impending surgery include anger, frustration, depression, aggression, and anxiety. A number of studies have shown a delayed healing process in individuals who experience stress. In addition, elevated cortisol levels, along with the inhibition of other immune responses, can contribute to prolonged tissue repair (Worley, 2004). Numerous studies have used pre-operative education to reduce stress. Investigations have shown the benefits of giving pre-operative information to patients, which include reduced anxiety, decreased length of stay, decreased perception of pain, less demand for analgesia post-operatively, lower infection rates, and increased patient satisfaction. However, despite this evidence, many studies reveal that patients are still going into surgery uninformed and highly anxious (Beddows, 1997; Hargreaves, 1992; Radcliffe, 1993). Therefore, the purpose of this study was to investigate the effects of a pre-operative educational program on self-reported anxiety and salivary cortisol for patients prior to and following surgery. Salivary cortisol levels, and self-report anxiety were assessed before and after the pre-operative education program and again just prior to the surgery. It was hypothesized that

a pre-operative education program will result in a decrease in self-reported anxiety and cortisol levels, reflecting a lower level of anxiety concerning the surgery.

CHAPTER II: METHODS

Experimental Design: The design of this experiment was a pretest-posttest randomized-group design that included a treatment group that received the pre-operative education and a control group. Participant assignment to the groups was random.

Subjects: Participants included patients undergoing any elective orthopedic surgery and ranged in age from 18 to 80 years. The participants were recruited in the physician's office by an investigator. With the physician's permission (see Appendix A), an investigator shadowed the physician in his clinic. Patients that met the criteria for participation were recruited to participate in this study. Participants were screened for any limitations that could impair participation in the educational program.

Instrumentation: Participants were asked to complete a pre-operation questionnaire that evaluated their emotional response to previous surgeries, prior experience in the hospital, the impending surgery, their confidence in their healthcare providers, and their commitment to adhering to the pre-operative education. This form also included basic demographic information (see Appendix B). A post-operation questionnaire addressed similar information (see Appendix B).

Each participant was also asked to complete the Perceived Stress Scale (PSS) to evaluate their perceived level of stress and anxiety. The PSS is a 10-item Likert-type scale about feelings and thoughts during the preceding month. It was scored from 0 (never) to 4 (very often). PSS scores were determined by reverse scoring the four

positively stated items (items 4, 5, 7, and 8) and then summing all the scale items (see Appendix C) (Cohen, Kamarck, & Mermelstein, 1983).

The participants also completed the State-Trait Anxiety Inventory. The State-Trait Anxiety Inventory (STAI) is a 40-question self-evaluation questionnaire that measures the fluctuating emotional state of an individual. The first 20 questions (state) provide information about the current emotional condition of the individual. The last 20 questions (trait) provide information about how the individual generally feels (see Appendix D) (Spielberger, Gorsuch, & Lushene, 1970).

In addition to the STAI and PSS inventories, the participants were also asked to complete the Hospital Anxiety and Depression Scale (HADS). The HADS is a quick and easily self-completed scale that has been validated and used extensively with hospital populations to assess anxiety and depression (Snaith, 1993; Moorey, et al, 1991). It measured 14 items, each item being scored from 0 to 3, with 7 items each for anxiety and depression. Anxiety and depression were assessed separately, each on a subscale of 7 items. Each subscale was scored out of 21. Each subscale allowed identification of those with high levels of anxiety and/or depression (see Appendix E) (Zigmond & Snaith, 1983).

Cortisol samples were obtained by having the individual chew on a cotton swab for 30 seconds. For each cortisol measure, two samples of saliva were taken 20 minutes apart. Each sample was taken at the same time each day. Cortisol samples were stored and analyzed in the University of Mississippi exercise physiology lab. A Bio-Rad Model 680 Microplate Reader and Bio-Rad Model 1575 Microplate Washer was used to perform the assays.

The educational program consisted of general information, such as the admission process, a description of the facilities, what to expect following the surgery, possible rehabilitation and suggestions for coping with the discomfort and pain. Also included in the pre-operative education was an explanation of the individual's specific surgery and the reason (i.e. injury or condition) for the surgery (see Appendix F). The educational information was presented by the investigator with the use of a laptop computer in the form of a PowerPoint presentation. To assess the participant's retention of the educational information a short self-test was administered (see Appendix F).

Experimental Procedures: An investigator shadowed a local orthopedic surgeon during scheduled clinic hours in order to recruit subjects for the study. Table 1 presents an outline of the experimental procedures. Consent was obtained on recruitment day or the first day of the study (day -7 from the day of surgery) prior to the education program, and each participant was randomly placed into either the control group or the treatment group. Participants completed the self-reports of anxiety (the State-Trait Anxiety Inventory, the Perceived Stress Scale, and the Hospital Anxiety and Depression Scale) on the first day of the study (day -7), the day before surgery (day -1), and the last day of the study (day +8). The individuals participated in the educational program seven days prior to their scheduled surgery (day -7) and participated in an abbreviated education review program the next day (day -6). As part of the education review, the participants were asked to complete a short post-test of the education material (see Appendix F). The participants were also asked to complete a post-test of the education material on the last day of the study (day -8) to assess the amount of information retained from the educational program (see Appendix F). The education program was scheduled by the investigator in the

doctor's office and occurred either in the Turner Center Room 246 on the University of Mississippi campus or in an office at the participant's workplace. The self-report inventories were completed during this time. For the treatment group, the education program began on day -7 while participants in the control group were provided with reading materials unrelated to medical issues, such as magazines like Newsweek or Time. Baseline cortisol levels were taken on day -7 prior to the education program and day -6 prior to the education review. Post-treatment cortisol levels were taken on the day before surgery (day -1) and days +7 and +8 following surgery. For each cortisol measure, two samples of saliva were taken 20 minutes apart.

Table 1
Study Protocol

Day	Control Group	Treatment Group
	Recruitment day: surgery is scheduled and informed consent signed.	Recruitment day: surgery is scheduled and informed consent signed.
-7	Consent form signed prior to start (if not already signed) Completion of STAI, PSS, and HAD Cortisol sample—2 samples within 20 minutes of each other	Consent form signed prior to start (if not already signed) Completion of STAI, PSS, and HAD Cortisol sample prior to education program – 2 samples within 20 minutes of each other Completion of educational program
-6	No treatment Cortisol sample—2 samples within 20 minutes of each other	Education review and post-test Cortisol sample—2 samples within 20 minutes of each other
-1	Cortisol sample—2 samples within 20 minutes of each other Completion of STAI, PSS, and HAD	Cortisol sample—2 samples within 20 minutes of each other Completion of STAI, PSS, and HAD
0	Surgery	Surgery
+7	Cortisol sample—2 samples within 20 minutes of each other	Cortisol sample—2 samples within 20 minutes of each other
+8	Cortisol sample—2 samples within 20 minutes of each other Completion of STAI, PSS, and HAD	Cortisol sample—2 samples within 20 minutes of each other Completion of STAI, PSS, and HAD Completion of education post-test

Statistical Analysis: The two cortisol measures for Day -7 and -6 were averaged to assess a pre-intervention baseline cortisol measure. Post-intervention cortisol measures were calculated in the same manner. A 2x3 (treatment, control x pre, pre, post) repeated measures analysis of variance (RMANOVA) was planned to assess cortisol changes and changes in anxiety. However, due to the limited number of subjects, individual data was plotted and visually inspected.

CHAPTER III: RESULTS

To examine changes that may have occurred in response to the educational treatment, a 2(treatment, control) by 3(days -7, -1, +8) was used. Repeated measures analysis of variance was planned. However, due to the limited subject number, a descriptive analysis is presented in the following figures.

There were a total of three subjects enrolled in the study. Subject 1 was placed into the treatment group. Subject 1 was a 50-year-old Caucasian female. She had a meniscus tear in her knee. The physician did a scope on her knee to minimize the pain. She reported that she had been hospitalized before as well as had undergone surgery previously. She also reported that she had been more nervous about her previous surgeries compared with how nervous she was about her current surgery. Subject 1 reported not having read any educational material related to her condition and upcoming surgery. She also reported not being educated by her physician about her upcoming surgery.

Subject 2 was placed into the control group. Subject 2 was a 77-year-old Caucasian male. After years of knee pain, he had decided to opt for a total knee replacement. He reported being hospitalized before and having previous surgeries. He also reported being as concerned with this operation as he was with any previous surgeries. Subject 2 reported having read educational and being educated by his physician about his condition and his upcoming surgery.

Subject 3 was also placed in the control group. Subject 3 was a 48-year-old Caucasian male who has severe arthritis in his shoulders. Subject 3 was also a diabetic smoker, so most surgeries were not a viable option for him. The physician was able to keep his shoulders from locking up by placing the patient under slight anesthetics and then manipulating his shoulders into the range of motion he should naturally be able to achieve. This helped reduce pain and promoted movement in the shoulder joint. Subject 3 had previously been hospitalized and reported having surgery in the past. He also reported reading educational material and being educated by his physician on his condition and upcoming surgery. Subject 3 had been employed with the hospital for over 20 years. This could be a reason he appeared to be unconcerned with his surgery.

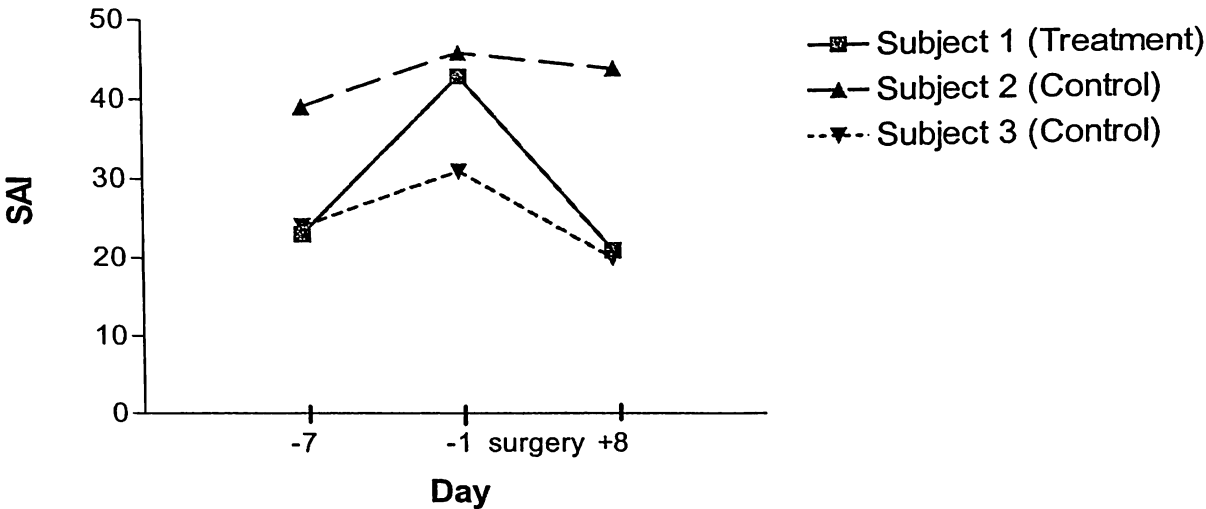


Figure 1. SAI- State Anxiety Inventory

As shown in Figure 1, SAI was tested prior to and following surgery. Subject 1 was exposed to the treatment and had a significant jump in anxiety the day before surgery, but also showed the greatest decrease in the post-op scores.

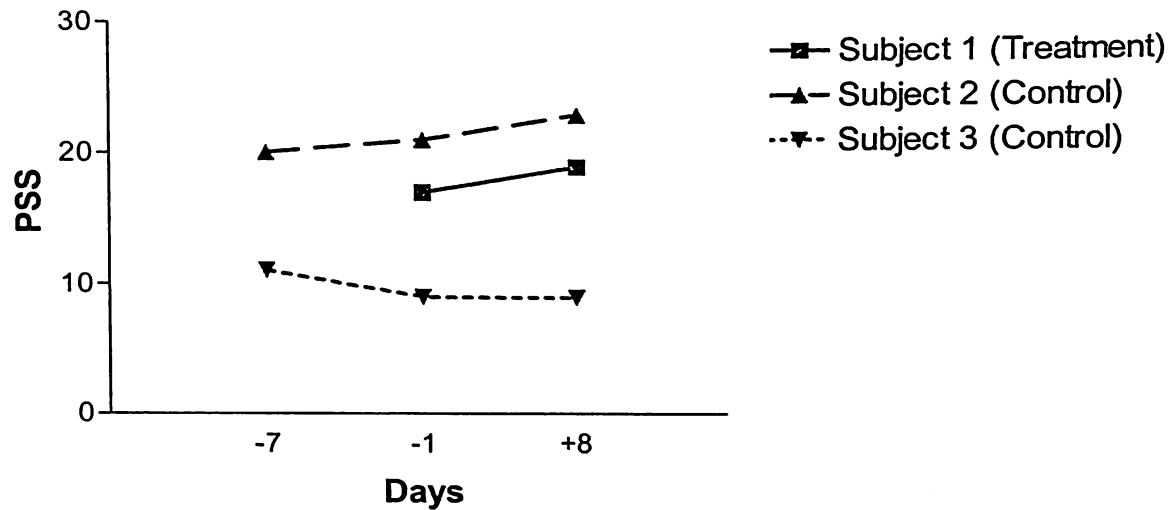


Figure 2. Perceived Stress Scale

As demonstrated in Figure 2, subject 1 failed to complete the PSS prior to surgery. Subject 2 had the highest perceived stress. The perceived stress of all three subjects increased or remained the same from the day prior to surgery to a week post-op.

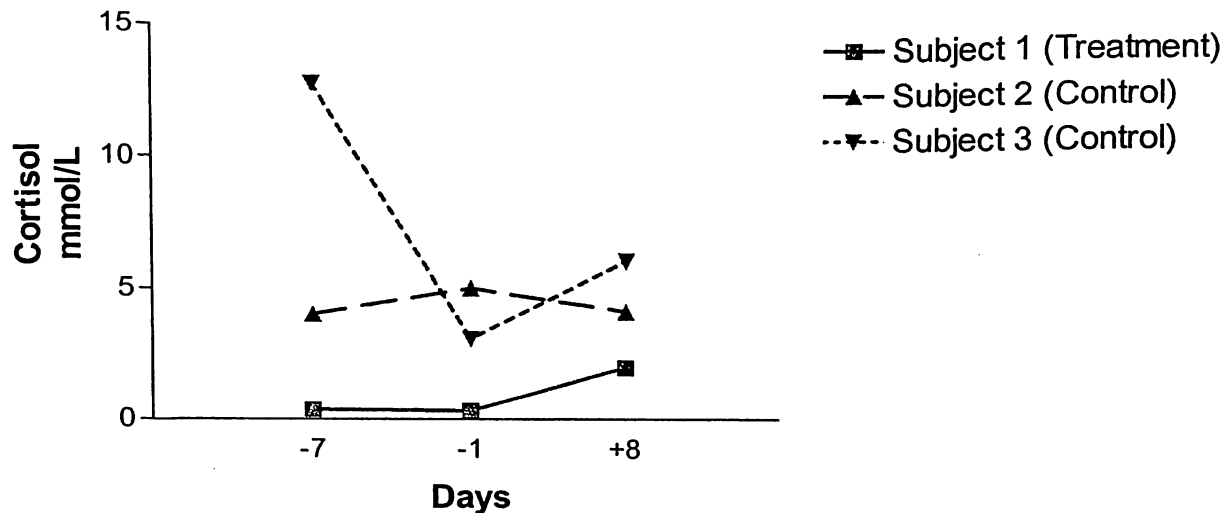


Figure 3. Cortisol responses

As displayed in Figure 3, subject 1 had extremely low cortisol levels. Subject 2 did exactly what was expected, the cortisol levels increased the day before surgery and then returned to lower levels. Subject 3 had an extremely high cortisol level a week before surgery, but then it dropped substantially the day before surgery, and rose again slightly post-surgery.

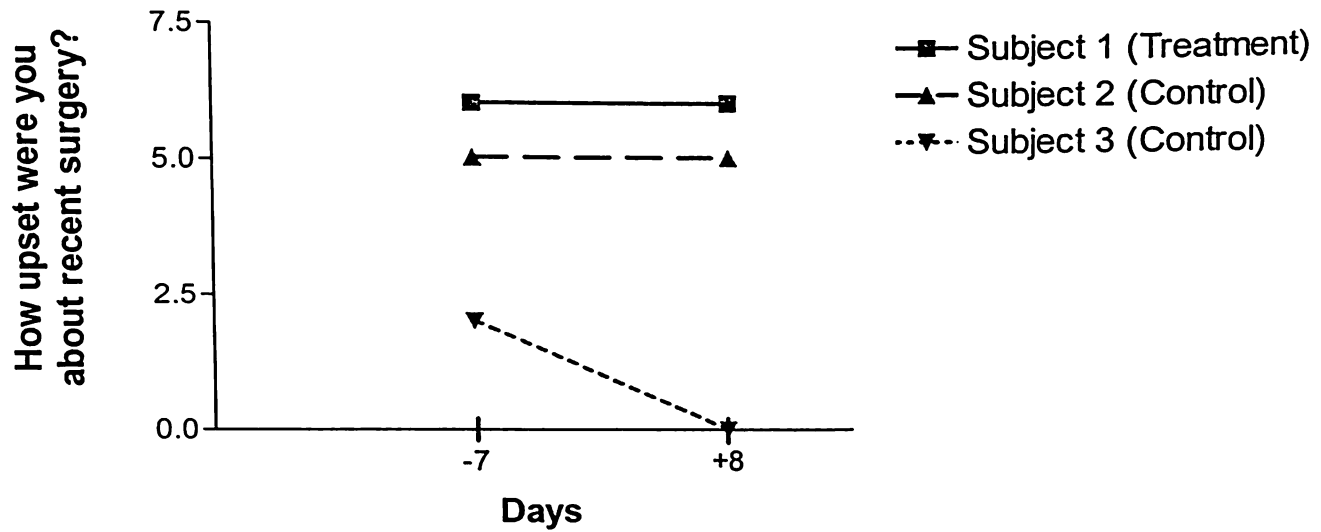


Figure 4. Response to question, “How upset are/were you about your upcoming/recent surgery?”

As shown in Figure 4, subject 3 had the lowest score for this question. He had the least severe surgery. The other two subjects remained equally upset before and after the surgery.

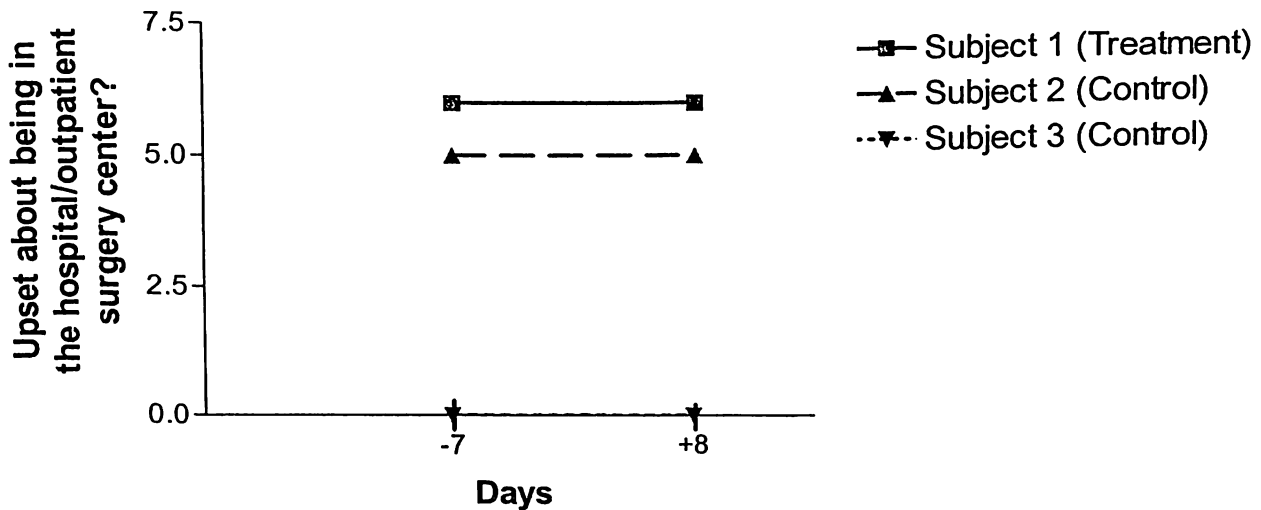


Figure 5. Response to question, “How upset are/were you about being in the hospital/outpatient surgery center?”

As displayed in Figure 5, Subject one had the highest score on this question. But, all three subjects remained equally upset after as before surgery.

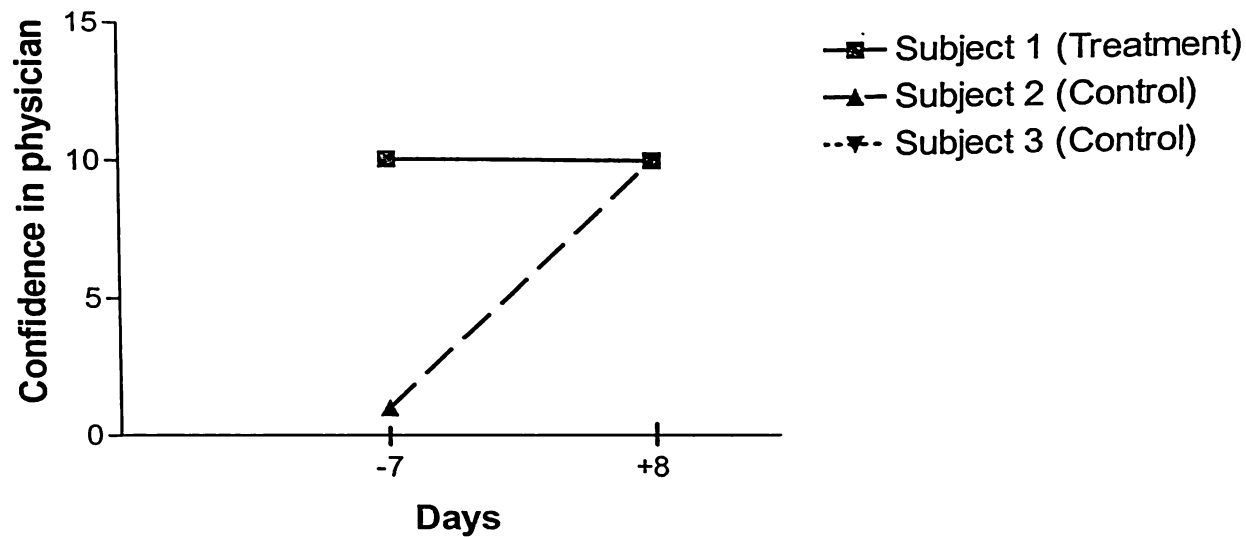


Figure 6. Response to question, “How confident are/were you that your physician will complete/completed the surgery successfully?” (Subject 1 and 3 had the same values).

As shown in Figure 6, subject 1 and 3 started off confident in the physician and remained that way post-surgery. Subject 2 was extremely confident in the physician post-surgery, but hardly confident at all before the surgery.

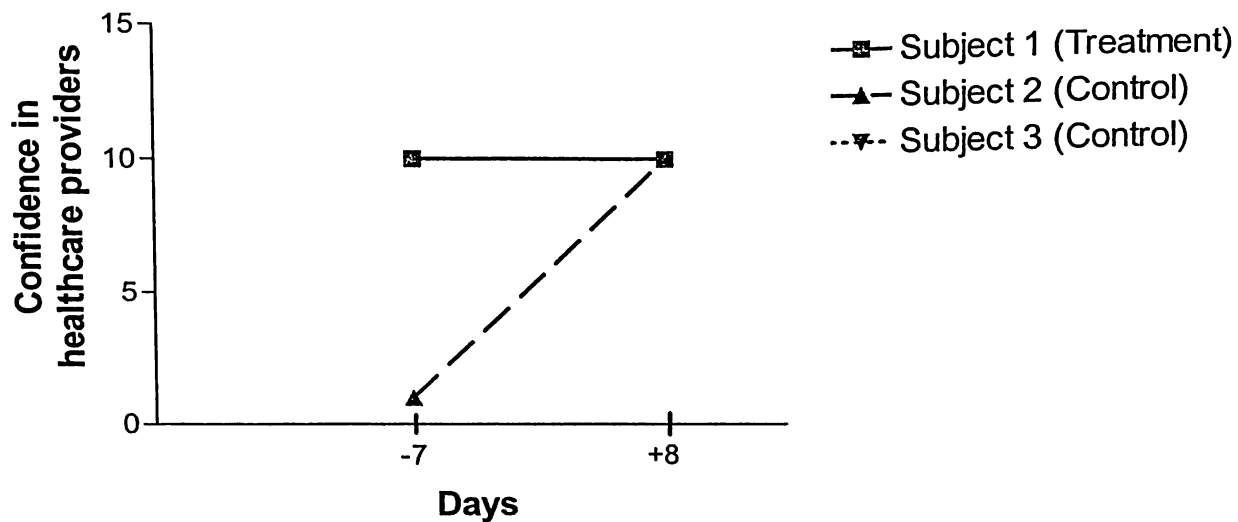


Figure 7. Response to question, “How confident are/were you that your support healthcare providers (nurses, surgery technician, hospital/outpatient surgery center staff, and physical therapist) are able to meet your healthcare needs after surgery?” (Subject 1 and 3 had the same values).

As demonstrated in Figure 7, subject 1 and 3 were extremely confident in the healthcare providers pre and post-op. Subject 2 was not confident at all prior to surgery, but post-surgery he was extremely confident.

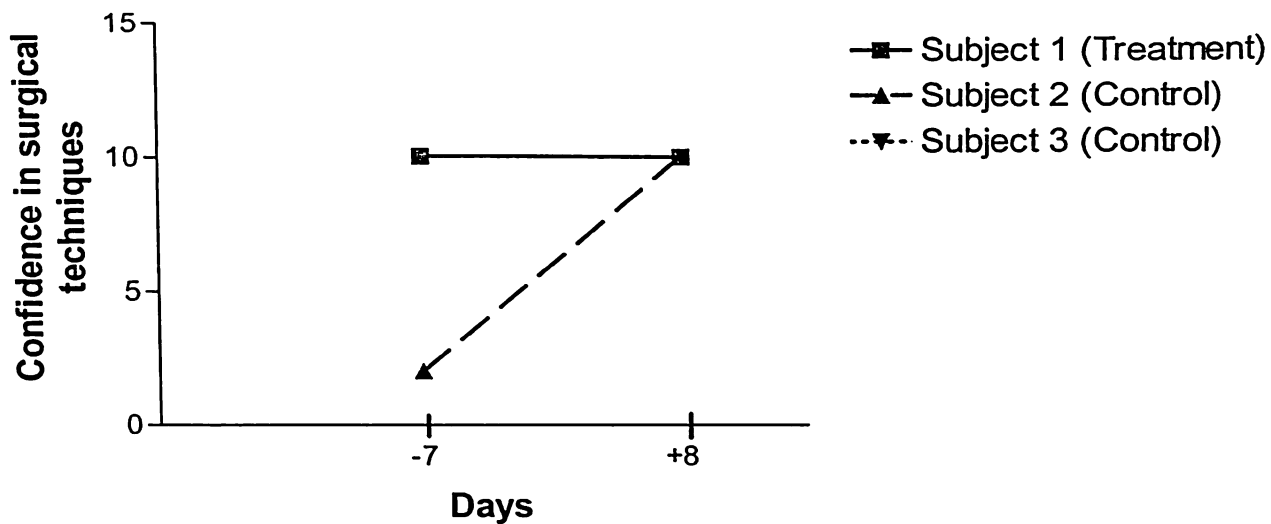


Figure 8. Response to question, “How confident are/were you in the surgical techniques that your physician will use/used?” (Subject 1 and 3 had the same values).

As displayed in Figure 8, subject 1 and 3 were extremely confident in the surgical techniques that they were to undergo before and after surgery. Subject 2 was not confident at all prior to surgery, but post-op he was extremely confident.

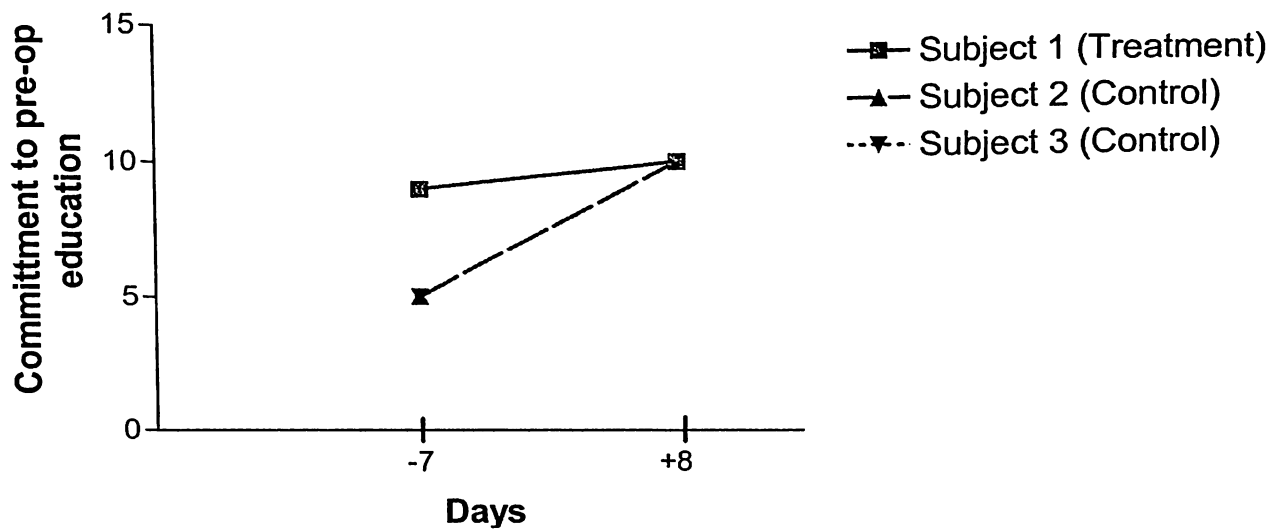


Figure 9. Response to question, “How committed are/were you to following the pre-operative education program?” (Subject 2 and 3 had the same values).

As demonstrated in Figure 9, subject 2 and 3 were neutrally committed prior to surgery, but extremely committed post-op. Subject 1 was extremely committed throughout the entire process.

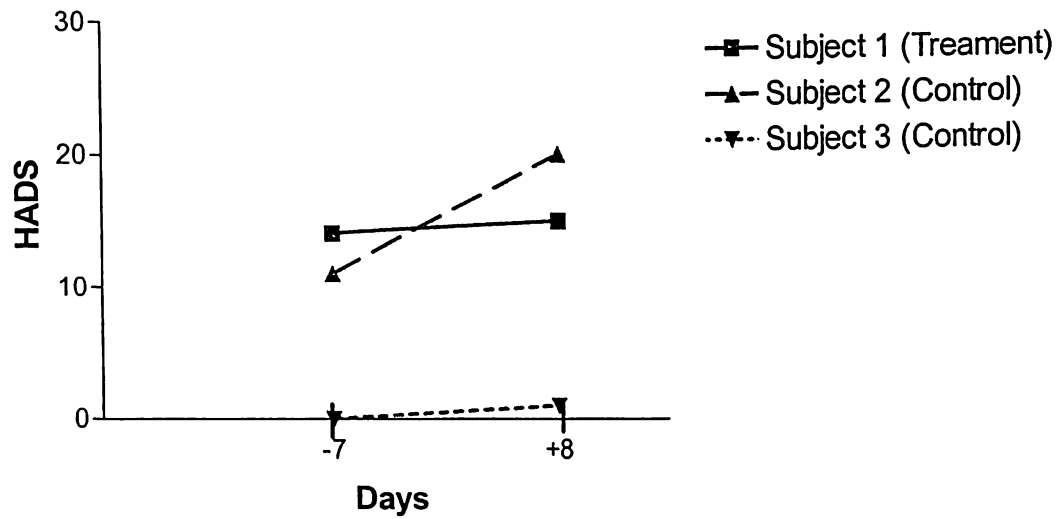


Figure 10. HADS- Hospital Anxiety and Depression Scale

As shown in Figure 10, subject 2 reported the greatest anxiety and depression levels on the HADS scale. Subject 2 also showed the greatest overall increase in anxiety from the pre to post-op scores. Subject 3 had a minimal amount of hospital anxiety or depression. Subject 1 did not report much of a change pre to post-op.

CHAPTER IV: DISCUSSION

The purpose of the investigation was to assess the effectiveness of a pre-operative educational program on reducing pre-operative and post-operative anxiety levels for patients having surgery. It was hypothesized that participation in a pre-operative education program would result in decreased levels of anxiety and cortisol prior to and after surgery, thereby reflecting a lower level of stress concerning the surgery and recovery. As a result of these lower levels of stress, the healing process and tissue repair after surgery would likely be facilitated.

There were only three subjects who could be recruited to participate in this study. This sample size is extremely small and therefore definitive conclusions cannot be made from this minimal amount of data. However, our cortisol analysis did show a lower level of cortisol in the subject who received the post-operative educational package. The SAI, HADS and PSS all showed that the treatment subject did not have the highest anxiety or stress levels. Subject 1, the treatment subject, was the most confident in the physician and health care providers. However, Subject 1 also reported being the most upset about her surgery.

Figure 1 shows the depiction of the subjects' scores on the State-Trait Anxiety questionnaire. When looking at the SAI questionnaire results we can see that Subject 1, the treatment subject, did not have the highest or the lowest levels of perceived anxiety. Anxiety levels spiked the day before surgery for all three subjects, which is to be

expected. All three subjects' anxiety scores also decreased after surgery, which is an anticipated response as well. Subject 2 had the most severe surgery, so it is not surprising that his anxiety levels are higher. Subject 1's surgery was more extensive than Subject 3's, and the anxiety levels correspond.

Figure 2 was a portrayal of the Perceived Stress Scale data. Subject 1 did not fill out the questionnaire pre-surgery, so a response cannot be presented from the week before surgery to the day before surgery. Subject 2 had the highest levels of perceived stress throughout the entire study. Subject 2 appeared to have an overall increase stress level, whereas Subject 3 appeared to be extremely nonchalant and unconcerned about any problems that might be occurring. All three subjects' perceived stress increased or remained constant before and after their surgery.

Figure 3 is a depiction of the cortisol levels throughout the study. Subject 1, who was in the treatment group, was shown to have the lowest levels of cortisol. These levels should typically be between 1-25 mmol/L. Subject 1's cortisol levels were well below one on day -7 and -1. Speculations as to why this occurred are food or drink in the subject's mouth during or right before the saliva samples were taken, blood or something else in the subject's mouth that could have masked the cortisol or even possible malfunction of the cortisol salivates. Subject 2's cortisol levels are what would be expected. He had a rise the day before surgery and then a decrease post-op. Subject 3's results are not what would be predicted. The analysis shows that the highest levels of cortisol were on day -7, and then they decreased substantially on day -1, and then increased again on day +8. Subject 3 had the most experience in the hospital setting, as he has been employed there for over twenty years. He was having only slight

manipulations of his shoulders done under mild anesthesia. This could be a possible reason for the lower levels on day -1.

Figure 4 shows the results to the first question of the Pre- and Post- Operative Questionnaire. The first question was “How upset are/were you about your upcoming/recent surgery?” Subject 1 and 2 reported being neutrally to fairly upset on day -7 and day +8. Subject 3 reported being slightly upset on day -7 and not upset at all on day +8. All three subjects had experienced some type of surgery before, so it is not surprising that all three reported being only mildly upset. Again, Subject 1 and 2 had more severe surgeries to be upset about compared to Subject 3.

Figure 5 depicts the answers to the question of “How upset are/were you about being in the hospital/outpatient surgery center?” Subject 2 reported being neutrally upset on days -7 and +8, while Subject 1 reported being fairly upset on both days. Subject 3 reported not being upset at all. Subject 1 had an outpatient surgery, but had a significant recovery time in the outpatient surgery center. Subject 2 had a total knee replacement and was admitted to the hospital for several days. Subject 3 was the only patient who did not have to stay for an extended period of time in the hospital or outpatient surgery center.

Figure 6 shows the response to the question, “How confident are/were you that your physician will complete/completed the surgical procedure successfully?” Subjects 1 and 3 reported being extremely confident before and after the surgery. Subject 2 reported being not confident at all before surgery, but extremely confident post-op. Subject 1 and 3 had undergone previous surgeries from the physician and might have therefore had

more confidence going into the surgery. Subject 2's surgery was more impending in his lifestyle, so being more concerned is not unnatural.

Figure 7 shows the response to the question, "How confident are/were you that your support healthcare providers (nurses, surgery technicians, hospital/outpatient surgery center staff, and physical therapist) are able to meet your healthcare needs after surgery?" Subject 1 and 3 were again extremely confident in their healthcare providers both before and after surgery, possibly due to the previous experiences. Subject 2 was not confident at all on day -7 (pre-surgery), but on day +8 (post-surgery), he was extremely confident in the healthcare providers.

Figure 8 shows the subjects' responses when asked, "How confident are/were you in the surgical techniques that your physician will use/used?" Once again, Subject 1 and 3 were extremely confident on days -7 and +8. Subject 2 was not confident before surgery, but extremely confident post-surgery. Total knee replacements are very technologically advanced. Possible reasons for a lack of initial confidence could be because of a lack of knowledge about the surgical technique. Subject 2 was the oldest of the three subjects and might not be as willing to accept newer technology.

Figure 9 depicts the subjects' responses when asked, "How committed are/were you in following the pre-operative educational program?" Subject 1 was extremely committed both before and after surgery. Subject 2 and 3 were neutrally committed before surgery, but extremely committed post-op. Subject 1 was the only patient to receive the educational program. Neither of the other two patients really had to make much of a commitment.

Figure 10 shows the results of the Hospital Anxiety and Depression Scale (HADS). Subject 2 reported the greatest overall stress about the hospital. Subject 2 also showed the greatest increase in anxiety from day -7 to day +8. Subject 3 had a minimal amount of hospital anxiety or depression before and after the surgery day. Subject 2's increasing hospital anxiety over day -7 to day +8 is not surprising because was required to spend an extended amount of time in the hospital. According to the study previously mentioned by Cochran (1984), hospitalization, regardless of disease or purpose, provokes a psychological response, including increased stress levels.

For the treatment subject we also administered a pre-test and post-test to ensure that the subject would attempt to retain the educational information. The pre-test was given on day -7 after the educational power point was reviewed. The post-test was given on day +8, but the power point was not reviewed again. This post-test was given to see how much of the education information was retained. The questions on the pre and post-test were identical. The questions were injury specific. An example of a test that was given to a patient with a meniscus tear is presented below: The first question about the cause of injury we asked was "Injuries result from...?" The answer choices were mechanical force is applied to a joint, habitual incorrect motion, anytime a structure is pushed beyond its normal limits, or all of the above. The correct answer was all of the above. The second question about the anatomy and physiology was "Injured tissue will be as strong as normal, uninjured tissue... True or False?" The correct answer is false. The third question we asked about surgical repair was "The day before surgery, you cannot have food after...?" The answer choices were 12:00 AM, 11:00PM, 5:00PM, or 8:00AM. The correct answer is 12:00AM-midnight. The fourth question we asked was

about sutures. “When will the sutures be removed?” The answer choices were 1-2 days post-op, 3-4 days post-op, 5-7 days post-op, or 10-11 days post-op. The correct answer is 5-7 days post-op. The fifth question was “While using crutches on stairs, this phrase is helpful to remember...” The answer choices were up with the bad, down with the good or up with the good, down with the bad. The correct answer is up with the good, down with the bad. The sixth question asked was about rehabilitation. “The initial goal of rehabilitation is to...” The answer choices are to reduce swelling, to return to normal living, or to make the patient cry. The correct answer is to reduce swelling. The seventh question we asked was, “You will be able to drive home immediately following the surgery, true or false?” The correct answer is false.

Since it was only administered to one subject, the results of the test cannot be analyzed. Subject 1 missed one question on the pre-test and a different one question on the post-test. If more subjects were given the educational package followed by the pre-test and the post-test then a better analysis of any good or bad questions could be made. The tests could also help identify which area of the educational information needed to be discussed better. Possible reasons for the subject incorrectly answering the questions could be due to information being portrayed incorrectly or not intensely enough during the pre-op education.

Limitations of this study include the small sample size. The subjects had to be diagnosed by the physician’s office that had agreed to be a part of the research. The subjects had to schedule their surgery at least a week before the actual surgery date in order for the samples to be properly collected. Geography was also a severe limitation. Most of the patients who were scheduled for surgeries lived greater than 40 miles away.

Overall three patients were recruited to participate in the study. If time had allowed, it would have been more effective and produced more valid results if a greater number of subjects could have been used in the study. Subject 1 not completing the first day of the perceived stress scale also hindered the full analysis of that data. Subject 3 who was in the control group might have had altered results because he has been an employee of the hospital for over twenty years. Subject 3 would have been accustomed to most of the pre-operative knowledge that was given to the treatment subjects. Therefore his stress, anxiety, and/or cortisol levels could have been skewed. Many of the other studies included in the literature reviews use subject numbers that are much greater than three. Beddows (1997) examined 40 subjects, Gammon and Mulholland (1996) examined 82, and Moorey (1991) examined over 568 patients. It is large sample sizes like these that provide results that can be better interpreted and support more decisive conclusions.

Further research is recommended on the effect of pre-operative education on reducing anxiety and cortisol levels prior to and following surgery. According to a study by Cochran (1984), hospitalization, regardless of disease or purpose, provokes a psychological response, including increased stress levels. Cochran also noted that patients who are ill tend to be relieved to be receiving treatment to ease their symptoms, but can also be unfamiliar with hospitals. A healthy patient might demonstrate increased stress levels due to being preoccupied with the new and potentially threatening aspects of experience. Further researching how to ease hospital anxiety would be a huge advancement for a large population. While this study attempted to reduce anxiety levels, two of the three subjects were not involved in a hospital stay of any great length. The recovery time of outpatient surgery is extremely minimal. Studies that could target the

patients who actually are required to stay overnight in a hospital might provide more accurate results for hospital patients.

The volunteers in the study were Caucasian middle-aged adults. All three of the subjects had been previously admitted into the hospital and had previous surgeries. These previous experiences could alter the validity of the data gathered. A more effective population to investigate might be children or college-aged adults. Many of these individuals have not had any earlier experience with surgery. The effects of the pre-operative educational information could be determined more effectively using patients who had not been exposed to any type of surgery or been in a hospital environment.

Further investigation should also be directed towards familiarity with the staff. As shown in the study of elective intensive care unit patients by Lynn-McHale et al (1997), 92 percent of surgical patients felt as though increased knowledge of the unit was beneficial in alleviating anxiety. An education program that could help patients know healthcare staff on a more personal level could lead to lower anxiety. As Spalding suggests, the ultimate goal of pre-operative education is “making the unknown familiar” (Spalding, 2003). Continuing research to determine the most effective ways to familiarize patients with their surroundings is warranted.

CHAPTER V: REFERENCES

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CHAPTER VI: APPENDICES

APPENDIX A

Letter of Support from Physician

I am fully aware of the research project that Dr. Ed Acevedo, Sara Lynn Johnson, and Lou Ann Balducci are proposing, *The Effects of Preoperative Education on Cortisol and Anxiety Levels in Patients Prior to and Following Surgery*. I agree to allow one investigator to shadow me during my regular clinic hours and recruit subjects to participate in the study. I understand that I can withdraw my support in the recruitment of subjects at any time.

Edward D. Field, MD
University Sports Medicine

Physician's Script:

Two students from the University of Mississippi are interested in conducting a research project on stress levels prior to surgery. One of them, Lou Ann Balducci is here today and would like to talk with you about participating in this study. Would that be O.K with you?

APPENDIX B-PART 1

Pre-operative Questionnaire

Name: _____ Age: _____ Gender: _____
Ethnicity: _____

Height: _____ Weight: _____ Surgery: _____ Date of
Surgery: _____

Please answer these questions by circling the appropriate answer.

Have you been hospitalized previously for any reason/condition? YES NO

Have you had any surgeries in the past? YES NO

Please answer these questions using the following scale.

0 = not upset at all 5 = neutral 10 = extremely upset

How upset are you about your upcoming surgery?

0 1 2 3 4 5 6 7 8 9 10

How upset are you about being in the hospital/outpatient surgery center?

0 1 2 3 4 5 6 7 8 9 10

How upset are you about previous surgeries (if applicable)?

0 1 2 3 4 5 6 7 8 9 10

How upset are you about previous hospitalizations (if applicable)?

0 1 2 3 4 5 6 7 8 9 10

Please answer these questions using the following scale.

0 = not confident at all 5 = neutral 10 = extremely confident

How confident are you that your physician will complete the surgical procedure successfully?

0 1 2 3 4 5 6 7 8 9 10

How confident are you that your support healthcare providers (nurses, surgery technician, hospital/outpatient surgery center staff, and physical therapist) are able to meet your healthcare needs after surgery?

0 1 2 3 4 5 6 7 8 9 10

APPENDIX B-PART 1 (Continued)

How confident are you in the surgical techniques that your physician will use?
0 1 2 3 4 5 6 7 8 9 10

Please answer these questions using the following scale.

0 = not committed at all 5 = neutral 10 = extremely committed

How committed are you to following the pre-operative education program?
0 1 2 3 4 5 6 7 8 9 10

Please answer these questions by circling the appropriate answer.

I have read education material related to my condition and upcoming surgery.

YES NO

I have been educated by my physician about my condition and upcoming surgery.

YES NO

APPENDIX B-PART 2

Post-operative Questionnaire

Name: _____ Surgery: _____ Date
of Surgery: _____

Please answer these questions using the following scale.

0 = not upset at all 5 = neutral 10 = extremely upset

How upset were you about your recent surgery?

0 1 2 3 4 5 6 7 8 9 10

How upset were you about being in the hospital/outpatient surgery center?

0 1 2 3 4 5 6 7 8 9 10

How upset are you about the recovery after your recent surgery?

0 1 2 3 4 5 6 7 8 9 10

Please answer these questions using the following scale.

0 = not confident at all 5 = neutral 10 = extremely confident

How confident were you that your physician completed the surgical procedure successfully?

0 1 2 3 4 5 6 7 8 9 10

How confident were you that your support healthcare providers (nurses, surgery technician, hospital/outpatient surgery center staff, and physical therapist) were able to meet your healthcare needs after surgery?

0 1 2 3 4 5 6 7 8 9 10

How confident were you in the surgical techniques that your physician used?

0 1 2 3 4 5 6 7 8 9 10

Please answer these questions using the following scale.

0 = not committed at all 5 = neutral 10 = extremely committed

How committed were you in following the pre-operative education program?

0 1 2 3 4 5 6 7 8 9 10

APPENDIX C

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
In the last month, how often have you felt that things were going your way?	0	1	2	3	4
In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

APPENDIX D

MIND GARDEN
Palo Alto, California

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-1

Please provide the following information:

Name _____ Date _____ S _____

Age _____ Gender (Circle) **M** **F** T _____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate value to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

NOT AT ALL
 SOMEWHAT
 MODERATELY SO
 VERY MUCH SO

- | | | | | |
|--|---|---|---|---|
| 1. I feel calm | 1 | 2 | 3 | 4 |
| 2. I feel secure | 1 | 2 | 3 | 4 |
| 3. I am tense | 1 | 2 | 3 | 4 |
| 4. I feel strained | 1 | 2 | 3 | 4 |
| 5. I feel at ease | 1 | 2 | 3 | 4 |
| 6. I feel upset | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes | 1 | 2 | 3 | 4 |
| 8. I feel satisfied | 1 | 2 | 3 | 4 |
| 9. I feel frightened | 1 | 2 | 3 | 4 |
| 10. I feel comfortable | 1 | 2 | 3 | 4 |
| 11. I feel self-confident | 1 | 2 | 3 | 4 |
| 12. I feel nervous | 1 | 2 | 3 | 4 |
| 13. I am jittery | 1 | 2 | 3 | 4 |
| 14. I feel indecisive | 1 | 2 | 3 | 4 |
| 15. I am relaxed | 1 | 2 | 3 | 4 |
| 16. I feel content | 1 | 2 | 3 | 4 |
| 17. I am worried | 1 | 2 | 3 | 4 |
| 18. I feel confused | 1 | 2 | 3 | 4 |
| 19. I feel steady | 1 | 2 | 3 | 4 |
| 20. I feel pleasant | 1 | 2 | 3 | 4 |

APPENDIX D (continued)

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name _____ Date _____

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate value to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

ALMOST NEVER
SOMETIMES
OFTEN
ALMOST ALWAYS

- | | | | | |
|--|---|---|---|---|
| 21. I feel pleasant | 1 | 2 | 3 | 4 |
| 22. I feel nervous and restless | 1 | 2 | 3 | 4 |
| 23. I feel satisfied with myself | 1 | 2 | 3 | 4 |
| 24. I wish I could be as happy as others seem to be..... | 1 | 2 | 3 | 4 |
| 25. I feel like a failure | 1 | 2 | 3 | 4 |
| 26. I feel rested | 1 | 2 | 3 | 4 |
| 27. I am "calm, cool, and collected" | 1 | 2 | 3 | 4 |
| 28. I feel that difficulties are piling up so that I cannot overcome them | 1 | 2 | 3 | 4 |
| 29. I worry too much over something that really doesn't matter | 1 | 2 | 3 | 4 |
| 30. I am happy | 1 | 2 | 3 | 4 |
| 31. I have disturbing thoughts | 1 | 2 | 3 | 4 |
| 32. I lack self-confidence | 1 | 2 | 3 | 4 |
| 33. I feel secure | 1 | 2 | 3 | 4 |
| 34. I make decisions easily..... | 1 | 2 | 3 | 4 |
| 35. I feel inadequate | 1 | 2 | 3 | 4 |
| 36. I am content..... | 1 | 2 | 3 | 4 |
| 37. Some unimportant thought runs through my mind and bothers me..... | 1 | 2 | 3 | 4 |
| 38. I take disappointments so keenly that I can't put them out of my mind..... | 1 | 2 | 3 | 4 |
| 39. I am a steady person..... | 1 | 2 | 3 | 4 |
| 40. I get in a state of tension or turmoil as I think over my recent concerns and interests..... | 1 | 2 | 3 | 4 |

APPENDIX E

Hospital Anxiety and Depression Scale (HADS)

Please circle one response from the four given for each item. Try to give an immediate response and be dissuaded from thinking too long about your answers. Please answer how each item currently describes your feelings.

1. I feel tense or 'wound up':

Most of the time

A lot of the time

From time to time, occasionally

Not at all

2. I still enjoy the things I used to enjoy:

Definitely as much

Not quite so much

Only a little

Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen:

Very definitely and quite badly

Yes, but not too badly

A little, but it doesn't worry me

Not at all

APENDIX E (Continued)

4. I can laugh and see the funny side of things:

As much as I always could

Not quite so much now

Definitely not so much now

Not at all

5. Worrying thoughts go through my mind:

A great deal of the time

A lot of the time

From time to time, but not too often

Only occasionally

6. I feel cheerful:

Not at all

Not often

Sometimes

Most of the time

7. I can sit at ease and feel relaxed:

Definitely

Usually

Not Often

Not at all

APENDIX E (Continued)

8. I feel as if I am slowed down:

Nearly all the time

Very often

Sometimes

Not at all

9. I get a sort of frightened feeling like 'butterflies' in the stomach:

Not at all

Occasionally

Quite Often

Very Often

10. I have lost interest in my appearance:

Definitely

I don't take as much care as I should

I may not take quite as much care

I take just as much care as ever

11. I feel restless as I have to be on the move:

Very much indeed

Quite a lot

Not very much

Not at all

APENDIX E (Continued)

12. I look forward with enjoyment to things:

As much as I ever did

Rather less than I used to

Hardly at all

13. I get sudden feelings of panic:

Very often indeed

Quite often

Not very often

Not at all

14. I can enjoy a good book or radio or TV program:

Often

Sometimes

Not often

Very seldom

Reference:

Zigmond and Snaith (1983)

APPENDIX F

Pre-Operational Education Program

This pre-operational program is being done on an 18yr. old high school athlete. During competition, the athlete states that he was running down the court on a fast break when an opposing player collided with him under the goal. The athlete remembers the opposing player running into him from the right side. After the injury, the athlete lay on the court until the coach was notified. He was then taken off the court for evaluation by the orthopedic doctor. His pain was described as a 6/10. He had pain on the outside of his left knee and felt a catching sensation while walking off the court. He complains that he is unable to fully extend his knee. He has never sustained an injury to his left knee prior to this occasion.

The athlete displayed minimal swelling and no deformity. Pain was located to the lateral joint line of his left knee. Manual muscle test was within normal limits. Range of motion was limited in both flexion and extension. Deep flexion produced moderate pain. Lochman Test, Valgus and Varus test were all negative. There was some pain and catching found with McMurray's Test. Diagnosis was a lateral meniscus tear of the left knee.

The athlete was taken the following day to the Dr's Office for further evaluation and MRI. MRI showed a tear of the posterior horn of the lateral meniscus. Moderate swelling was noted on the lateral aspect of the athlete's left knee. It was suggested that surgical intervention was needed and the athlete was set up for arthroscopic meniscectomy of the lateral meniscus of the left knee.

The education program will be based around the idea that the athlete will undergo normal procedures of an arthroscopic repair of the meniscus. Both meniscal repair and meniscectomy will be discussed in the event that the tear is greater than expected and further surgical procedures are rendered.

Pre-Operational Educational Session

The following guidelines will be followed to help explain what is to be expected prior to and after surgery.

- Cause of injury: what exactly caused the injury
- Mechanism of Injury: structurally, what happened to the body to allow the injury to occur
- Hospital Procedures: parking, into to the hospital and staff, an estimation of what the office visits will entail
- Surgical Procedures: includes admission, pre-op, and post-op procedures in the hospital
- Rehabilitation Process: specific timeline to guide the patient through the rehabilitation stages after injury

APPENDIX F (Continued)

Cause of Injury

Injuries are sustained due to internal or external forces directed on the body. They can occur anytime a structure is pushed beyond the normal range of motion. The injury that was sustained occurred for several reasons.

- The opposing player caused a lateral force against your knee, moving it in a direction that it typically does not go
- When the hit occurred your foot was planted in the ground, and remained stable while your knee was twisted

Mechanism of Injury

1. When your knee was twisted, the lateral meniscus became pinched between the condyles of the knee- (At this time, a model of the knee will be shown to the athlete. The anatomical structures will be shown and described. The knee model will also be twisted in the same fashion that the athlete's knee was twisted, to allow for visual affect of the injury.)
2. Because the meniscus was pinched, as the knee twisted, pieces of the meniscus began to tear. This leads to a "fraying" of the meniscus. (A picture of a "frayed" meniscus will be shown to the patient, helping them to understand what occurred.)
3. There is a poor blood supply where the meniscal tear is located. Therefore, the typical treatment for your injury is to remove the piece of the meniscus that is torn. Keep in mind that ONLY the piece that is torn is being removed. The orthopedic doctor is not removing your entire meniscus. (The area that will be removed from the meniscus will be designated on an illustration presented to the patient.)
4. Due to the injury, swelling and inflammation will begin to set into your knee. This is due to bleeding from the torn meniscus as well as the release of fluid from within the capsule that lines the knee joint. The swelling will form initially inside the knee joint, and then migrate outside of the joint. This is why there is usually a delay in swelling during a meniscal injury.
5. Bending and straightening your knee may be tough because of the swelling and tightness of the surrounding tendons.
 - Extension is sometimes hard because there is so much swelling in the joint that it is unable to straighten.
 - Flexion can be painful because of the swelling as well as the frayed meniscus becoming trapped between the condyles of your knee.
 - There can also be a clicking or a catching sensation that can occur. This is because the frayed meniscus is getting caught between the two condyles.

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- There also may be some pain behind your knee as well as a small knot. This can be due the release of the joint fluid that accumulates in the back of your knee. This is one of the signs of a meniscal tear.

Coping

In addition to the physiological changes that the body makes after an injury, there are certain psychological reactions that occur that can play a large part of the rehabilitation process. Few athletes acknowledge that a serious injury could occur to them. So, when an unexpected injury occurs, the impact is severe. Athletes that are injured and are required to undergo surgical procedures are faced with the loss of athletic competition and camaraderie. The more severe the injury and surgical procedure, the greater sense of loss will be felt by the athlete. According to Kubler-Ross, there are five stages in the grief process that an athlete must go through to cope with an injury (Booher & Thibodeau, 1994).

The first stage of the coping process is denial. Initially, you may refuse to acknowledge the fact that you have been injured. You may have even tried to play through the pain, refusing to believe that the injury was serious. After your injury was diagnosed, you may have had doubts that something was wrong. However, after second opinions and time to realize the extent of the injury, you finally acknowledge the severity.

After recognition of injury, you may have expressed anger toward yourself or other individuals such as your teammates, athletic trainer, physicians, coaches, or peers. As you replay the injury in your mind, you become more frustrated with the situation that caused you to be injured. This anger is the second stage of the grief process.

The third step is bargaining. At some point, you may have tried to bargain with the athletic trainer or physician to let you attempt to play again. You when surgery was recommended, you possibly thought about trying to play the remainder of the season before you had the injury repaired. However, this was not an option because you put yourself at risk for more serious long-term damage.

Once you have realized that you can not talk your way out of the injury and that you are going to need surgery to repair it, you begin to feel a state of depression. Quite possibly you began to feel isolated and a sense of loneliness. This is to be expected because, for a short time, you are no longer able to participate in something that is enjoyable and motivational to you. The athletic trainer will recognize this stage of depression and immediately explain to you the positive outcomes that will be seen after surgery. If you have the appropriate mind-set going into surgery then your post-operational rehabilitation will be much less strenuous. You will see improvements much faster than if you have a sense of negativity and depression going into surgery.

The final stage of the grief process is acceptance. In this stage, you have acknowledged the fact that an injury has occurred and that you will need surgery. You are ready to proceed with procedures and work yourself back into competition. It is important to remain positive throughout the time that you will be out.

APPENDIX F (Continued)

Surgery

Now that you have been seen by the doctor, and surgical intervention is recommended, you will now learn the process of the actual surgery day. Again, your meniscus does not heal well on its own, and in most cases does not have a good blood supply. Some individuals can choose not to operate on their torn meniscus. However, the frayed meniscus will continue to be trapped in the knee and cause grinding of the condyles in the knee. This will lead to early arthritis of the knee. Therefore, it is in your best interest to surgically repair the tear. This will promote a faster recovery from the injury and allow you to compete without experiencing the side effects of a torn meniscus (i.e. clicking, catching, swelling, and inability to bend your knee).

- Pre-operational rehabilitation
 - Before being operated on, your physician would like for you to have as much flexibility and strength in your knee as possible. In order to achieve this, exercises such as quad sets, straight leg raise, and heel slides may be implemented.
- Day before surgery
 - No food or drink after midnight
- Day of surgery
 - Arrive at the surgery center (time dependent on surgery time)
 - Fill out paperwork (insurance forms, contact information and demographics, and disclaimers)
 - Be called back to the pre-op room: nurse will take your blood pressure, height, weight, temperature, urine sample, blood work, and confirm injury site (they will usually write WRONG on the uninjured knee). You will also remove all jewelry and be given a gown to wear
 - Medication will be given. This will include medication given through the veins (usually the tube is left in the elbow or hand from blood work being taken)
 - You will then be placed on a bed and rolled into the operating room. Prior to this, doctor will come and discuss surgical procedures.
- Surgical Procedures
 - Estimated time of surgery- 45 minutes
 - 3 small incisions will be made (1 for the arthroscope, 1 for the saline solution, and 1 for the shaver that is used to trim the torn meniscus)
 - (Pictures of the incisions and tools will be shown)
 - 1st step: the doctor will look over the inside of your knee to make sure there are no other injuries
 - 2nd step: clean up the meniscus: this includes removing the frayed aspect of your meniscus with the shaver. Only the injured aspect of the meniscus will be taken. The doctor will then heat the remaining meniscus to promote healing.
 - In the event that the tear is found in a vascular area of the meniscus, the doctor may choose to suture the injured area. This would entail small sutures being placed in your meniscus instead of the area being removed.

APPENDIX F (Continued)

- 3rd step: clean any other areas that need to be addressed (i.e. roughening under the knee cap, scar tissue buildup in the knee from injury)
- 4th step: take pictures of before and after the repair. This will help him show you what was done inside your knee.
- 5th step: close incision sites with stitches or small steri-strips

Recovery

After surgery you will be taken to the recovery area where you will remain until you are fully awake. Here they will monitor your pain and assure that you do not have any reactions to the pain medication. The time you will spend in recovery will depend on the effects of the medication given. Once your vital signs have returned back to normal, and you are conscious of your surroundings, you will be free to leave.

Pain Management

The nurse will give you at home instructions to control swelling and inflammation as well as any prescriptions needed for medication. You may take this medication as long as pain persists. The goal of pain medication is to reduce the amount and frequency in which you need it. As you move further away from your surgery, you may want to gradually begin to switch to over the counter medications such as Tylenol and Advil.

At home instructions that you should follow at home include icing the knee 20 minutes every hour, compression wrap, and elevation of the knee. As much as possible, you should stay off your feet. Rest is a key factor in controlling pain and helping your body heal. This will prevent swelling from accumulating below your knee. Reducing the swelling as fast as possible will help reduce the amount of pain that you will experience. Proper crutch use and weight bearing guidelines should be used. This requires you to move the crutches forward with your injured leg. Your injured leg should have little to weight being applied. The uninjured knee will then follow. Most or all of your weight will rest in the crutches and the uninjured leg.

Rehabilitation

Post-op rehabilitation contains 3 main goals. The first goal is to decrease the swelling that accumulated after the surgery. The physical therapist will attempt to control the swelling with ice, electrical stimulation, compression, and elevation. Ice will decrease the blood flow to the affected area through vasoconstriction. Electrical stimulation will help pump the swelling out of the injured area through involuntary contraction and relaxation of the muscle. The compression will be used via a compression sleeve that may be worn at all times until the swelling has been eliminated from your knee. Elevation will be done during the ice and electrical stimulation treatment. This is to keep the blood flow from gathering in or below your knee. Due to the swelling in your knee, it is difficult for proper blood flow, making elevation a necessity. The medication prescribed by the doctor will also help to decrease swelling.

APPENDIX F (Continued)

The second goal for post-op rehabilitation is to control pain. Most of the activities that will be used to decrease swelling can also help the pain level from surgery, including ice, elevation, compression, and electrical stimulation. Initially, the doctor will prescribe pain medication to assist you in the first few days of discomfort. Your goal should be to work away from the use of prescribed medication to the use of over the counter anti-inflammatories such as Advil or Tylenol. Also, the physical therapists may utilize the use of electrical stimulation units to help control your pain and eliminate discomfort.

Once these goals have been met, the final goal of rehabilitation will focus on strengthening and movement in your knee. A specific protocol has been designed for your surgery that gives weekly progressions in strength and range of motion of your knee. The physical therapist will follow these guidelines, working towards functional activity and return to play status. Range of Motion (ROM) can be achieved through passive work (done by the physical therapist without your assistance) and active work (done with your assistance). Exercises that will be used to regain motion can include heel slides and wall slides. Regaining strength in your knee will be correlated with ROM. In order to progress in strength, there must be pain free ROM. You will begin your rehabilitation by performing open chain exercises. These are non-weight bearing exercises such as quad sets, straight leg raise, and knee extension. After the appropriate time has elapsed, you will then begin to work on closed-chain exercises. These exercises require weight-bearing of the affected knee. In this stage you will perform squats, calf raises, gait training, lunges, etc.

Further progression of the rehabilitation process will allow you to begin performing more functional activities that are similar to your daily living activity requirements. The physical therapist will begin to work on cardio respiratory fitness with you so that you will not lose any conditioning that you had prior to injury. Also, functional progression will include a series of gradually progressive activities designed to prepare you for return to normal living and possibly athletics. Those skills necessary for successful participation in basketball are broken into component parts. You will be able to perform these skills, progressing as tolerated. The main goals of functional progression are to ensure that your knee is ready to return to competition as well as reduce the anxiety and apprehension of an athlete when they return to a competitive environment, as well as with daily living requirements.

APPENDIX F (Continued)

Menisectomy Rehabilitation Protocol

Treatment	Week 1	Week 2-3	Week 4-8
Functional Progression	Begin full weight bearing with crutches	D/C crutches; work on closed chain strengthening exercises	Progress to functional activities sport specific
Rehabilitation	Quad Sets, straight leg raises, Heel slides, Hamstring stretching, prone terminal knee extensions, calf raises	Ball squats, leg press, gait training, lunges, knee extensions, step ups, hamstring curls	BioDex testing, lateral step overs, Quick steps, plyometric hops, sprints, zigzags,
Goals	Quad recruitment, control swelling/pain, full weight bearing, gait control, full extension/flexion of knee	No pain/swelling during exercises, full range of motion	Functional progression to athletic competition

Expectations

During your rehabilitation process, your physical therapist will assist you in the following ways:

- Encouragement and positive reinforcement
- Designing creative exercises for your routine to keep you interested and motivated
- Being supportive
- Having a positive attitude
- Clearly explaining treatment plan instructions both verbally and written
- Adjusting rehabilitation times to fit your class or schedule

Criteria to return to normal living

After you have finished your rehabilitation process, there are certain guidelines that must be met before you can be released to full competition. They are as follows:

- Achieving full ROM, strength, neuromuscular control, and sport specific skills with no pain
- Regaining confidence in knee
- The doctor has cleared you from his care (This means that the injury to your meniscus has fully healed and you are not at risk for further injury)
- Completing and passing of all functional tests

APPENDIX F (Continued)

Post Education Test Questions

- I. Causes of Injury
1. Injuries result from
 - a. mechanical force is applied to a joint
 - b. habitual incorrect motion
 - c. anytime a structure is pushed beyond its normal limits
 - d. all of the above**
- II. Anatomy and Physiology of Injury
1. Injured tissue will be as strong as normal, uninjured tissue
 - a. True
 - b. False**
- III. Surgical Repair
1. The day before surgery you cannot have food after
 - a. 12:00 AM**
 - b. 11:00 PM
 - c. 5:00 PM
 - d. 8:00 AM
 2. When will the sutures be removed?
 - a. 1-2 days post-op
 - b. 3-4 days post-op
 - c. 5-7 days post-op**
 - d. 10-11 days post-op
 3. While using crutches on stairs, this phrase is helpful to remember.
 - a. Up with the bad, down with the good
 - b. Up with the good, down with the bad**
- IV. Rehabilitation
1. Your physical therapist can speed the healing process.
 - a. True
 - b. False**
 2. The initial goal of rehabilitation is to
 - a. reduce swelling**
 - b. return to play
 - c. reduce the discomfort of rehabilitation
 3. To be considered ready "fully recovered" you must pass a functional test
 - a. True**
 - b. False
- V. Adjustment to Home
1. You will be able to drive immediately following the surgery
 - a. True
 - b. False**

APPENDIX G

Consent to Participate in an Experimental Study

The Effects of a Pre-operative Education Program on Cortisol and Anxiety Levels
Prior to and Following Surgery

Investigators

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Description

We are asking you to volunteer for a study investigating the effects of a pre-operative education program on stress levels prior to surgery. Several studies have demonstrated that pre-operative education can reduce stress, reduce length of stay in the hospital, decrease infection rates, and reduce perceived pain. This study will examine other beneficial effects of a 45-minute pre-operative education program including reduced anxiety and reduced stress blood chemicals (cortisol). You have an equal (50-50) chance that you will get the education program or that you will get no education. In other words, you will randomly be put into a group that gets the program or into a group that does not get the program (like drawing straws).

The first day of the study will be seven days prior to your scheduled surgery. You will be asked on the first day to complete several forms including a Pre-operative Questionnaire and other questionnaires that rate your level of anxiety. You will again complete the anxiety questionnaires the day before surgery and the last day of the study. Completion of the questionnaires should take no longer than 20 minutes.

Cortisol is a hormone in the body that is directly affected by anxiety and stressful events. Measuring cortisol levels in the body has been shown to be a good indicator of an individual's stress level. Measuring the amount of cortisol in the saliva in a person's mouth is an easy way of determining this level. Cortisol levels will be obtained by chewing on a cotton swab for 30 seconds. Cortisol levels will be taken twice, 20 minutes apart, on the first day of the study, the following day, the day before surgery, and 7 and 8 days after surgery.

If you are in the group selected to receive the education program you will meet with an investigator and the education will begin on the first day of the study. The following day you will again meet with the investigator for a brief education program review and short quiz. You will be asked to meet with the investigator in either an office in the Turner Center on the University of Mississippi campus or in a private room at your place of

APPENDIX G (Continued)

work. The pre-operative education should take no longer than 45 minutes. Pre-operative education is the technique of familiarizing you with aspects of your condition and impending surgery, including the facilities, staff, surgical procedures, and what to expect after surgery. The day before surgery, the investigator will meet with you to obtain a saliva sample and complete the anxiety questionnaires. Eight days after surgery, you will be asked to complete a short quiz on the education material. Your participation in the study will be complete in 15 days.

Alternative Treatment

Pre-operative education provides benefits beyond stress management. However, if you are interested in further stress management services you can speak with your physician or contact one of the following providers: Psychological Services Center on The University of Mississippi campus (915-7385), Communicare (234-7521), and Baptist Behavioral Health Center (236-6696).

Risks and Benefits

There are no foreseeable risks associated with this study. Benefits, if any, will be limited to participants in the pre-operative education group, and might include knowledge gained from information pertaining to the subjects' condition and surgery as well as reduced stress, anxiety, and healing time after injury.

Confidentiality

The results of the tests and all the associated records will be kept confidential, and only members of the investigative team will have access to these documents. If your individual test results are reported at a scientific meeting or published in a scientific journal, only your assigned participant number, rather than full name, will be used.

Protected Health Information

Protected health information is any personal health information which identifies you in some way. The data collected in this study includes information about your surgery. A decision to participate in this research means that you agree to the use of your health information for the study described in this form. This information will not be released beyond the purposes of conducting this study. The information collected for this study will be kept until the study is complete. While this study is ongoing you may not have access to the research information, but you may request it after the research is completed.

Right to Withdraw

If you start the study and decide that you want to withdraw, you need only to inform Sara Lynn Johnson or anyone else on the research team. You can do this in person in the physician's office or by phone at (662) 915-1925. Whether or not you choose to participate or to withdraw will not affect your standing with The University of Mississippi, the Department of Health, Exercise Science, and Recreation Management, or with the physician and will not cause you to lose any benefits to which you are entitled.

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IRB Approval

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University Policies. If you have any questions, concerns or reports regarding this study, please contact the IRB at (662) 915-7482.

Statement of Consent

I have read the above information. I have been given a copy of this form. I have had an opportunity to ask questions, and I have received answers. I consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

**NOTE TO PARTICIPANTS: DO NOT SIGN THIS FORM
IF THE IRB APPROVAL STAMP ON THE FIRST PAGE HAS EXPIRED.**