1-1-1992

The effect of music on anxiety in patients undergoing arthroscopic knee surgery

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Order Number 1351246

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THE EFFECT OF MUSIC ON ANXIETY IN PATIENTS UNDERGOING ARTHROSCOPIC KNEE SURGERY

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of

Master of Science
in
Nursing

Department of Nursing
University of Nevada, Las Vegas
December, 1992

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ABSTRACT

This study focuses on techniques for decreasing anxiety levels in preoperative patients scheduled for out patient arthroscopic knee surgery. The purpose was to assess the influence of sedative music, as a nursing intervention, on the patient's postoperative anxiety level.

The review of literature offered conflicting results in reference to music as an intervention to reduce anxiety. These conflicting results suggested that further research was indicated.

The methodology included a sampling of patients scheduled for out patient arthroscopic knee surgery from the practice of one orthopaedic surgeon in Southern Nevada. Random assignment to a music treatment group or a no music control group, by surgical day, was performed. The experimental (music) group (n = 12) was given a tape recorder with headphones and instructed to listen to their music selection throughout the surgical experience. The control group (n = 11) received routine nursing care for arthroscopic knee surgery patients. Spielberger's (1966) State Trait Anxiety Inventory was administered to both groups before and after surgery. The physiological measures of blood pressure, heart rate, and respirations were

recorded at five specific intervals.

Demographic data were obtained from each subject by self-report completion of a demographic data form. Demographic data were analyzed using descriptive statistics. An independent t - test performed on postoperative state anxiety scores indicated no significant difference between the groups. Paired t - tests on pre- and post-treatment physiological measures showed no significant difference between the experimental and the control groups. Qualitative analysis revealed that the music group felt that the intervention helped them to feel more relaxed. Even though no statistical evidence supported the use of music in decreasing patient anxiety during the perioperative period, the positive responses of the subjects in the experimental group lend support to the use of music as a beneficial nursing intervention.

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ACKNOWLEDGEMENTS

I wish to express my gratitude toward the Zeta Kappa Chapter of Sigma Theta Tau for the generous scholarship which helped to fund this study.

I would like to thank Critikon, Inc. for the use of the Dinamap (TM) Monitor for physiological data collection throughout the length of the study.

I would also like to thank the nurses in the Ambulatory Surgery Unit, the Operating Room and the Post Anesthesia Care Unit for their assistance and support throughout the study. I also want to thank the administration of the hospital for allowing me to conduct this study in their facility.

I wish to thank my employer for his steadfast support of my educational endeavors, his encouragement, and allowing me to utilize our patients in my study.

I would like to express my deep appreciation to my thesis chairperson, Dr. Carolyn Sabo, for her continued encouragement and patience. I would also like to thank Dr. Margaret Louis for the special assistance she provided. I also wish to thank the rest of my committee for their guidance and support; Dr. David Weide and Ms. Priscilla Peters.

Chapter 1

Introduction

Surgery can be an extremely stressful experience for everyone involved; the surgical team as well as the patient (client). In my experience as a surgical assistant, music is played in our surgical suite to help decrease the stress levels of the surgical team. "Music is often used in surgical suites for its ability to relax the hospital staff" (Kolkmeier, 1989). Over the years, many patients have told me, postoperatively, that the last thing that they remembered before going to sleep was hearing the music and how it made them "feel better".

The increased number of same day surgeries in recent years has resulted in a decline in the use of preoperative sedative injections ordered by anesthesia personnel. Anesthesiologists do not have an opportunity to assess the patient prior to their arrival in the surgical holding area (Merriman, 1990). Anesthesiologists also feel that to best perform an assessment, the patient needs to be fully awake, alert, and cooperative, a condition not possible if the patient had received sedative medications. Consequently, patients arrive in the surgery holding area fully awake and

often quite anxious.

Surgery is assumed to be a stress producing event (George and Scott, 1982). Anxiety is considered to be a subjective reaction within the individual to a stressor (Kapnoullas, 1988). Anxiety results in sympathetic nervous system (SNS) arousal which is characterized by increases in blood pressure, heart rate, respiratory rate, temperature, skeletal muscle tension, and sensory perception. The potential side effects of anxiety include: (1) increased blood pressure complicating anesthetic drug administration (Bonny and McCarron, 1984); and (2) increased SNS activity leading to increased cardiac workload (Zimmerman, Pierson, and Marker, 1988) which could complicate postoperative recovery. Nursing interventions aimed at decreasing anxiety need to be implemented in an attempt to improve patient care and facilitate patient recovery.

The effect of music on decreasing anxiety and discomfort has been recognized since ancient times (Cook, 1986). Music has been used by primitive man to ward off evil spirits, by Egyptians to increase the fertility of women, and by Persians to cure illnesses (Cook, 1981). The Bible discusses the use of music in the treatment of ailments, "...when the evil spirit from God was upon Saul, that David took a harp and played with his hand; so Saul was refreshed and was well and the evil spirit departed from him" (I Samuel 16:23).

Jones and Schlotter (cited in Cook, 1981) found music of a calm and soothing variety to be useful in decreasing anxiety observed in children and adults. Stoudenmire (cited in Cook, 1981) investigated the effects of music on state and trait anxiety and concluded that music could significantly reduce state anxiety.

McClelland (cited in Cook, 1981) advocates the use of music in the operating room stating that music may benefit the patient in a variety of ways. Music can create a pleasant environment, provide diversion, and make the time pass more quickly. Evaluation of the effects of music to decrease the anxiety levels of surgical patients undergoing out patient arthroscopic knee surgery has contributed to the knowledge base in the area of music's influence on anxiety level.

Problem Statement

The problem of concern in this study is increased state anxiety levels in preoperative patients scheduled for out patient arthroscopic knee surgery. Increased patient anxiety resulting from activation of the SNS may complicate the patients recovery from surgery. Nursing interventions, such as the use of music, directed at diminishing anxiety contribute to optimal patient care.

Purpose

The purpose of this study was to assess the influence of sedative music (Cook, 1981) on the patient's postoperative anxiety level as demonstrated by decreased state anxiety and decreased SNS response. Specifically, a decrease in the blood pressure, heart rate, and respiratory rate towards the patient's normal baseline values.

Significance of the study

Preoperative anxiety is the most common diagnosis made by operating room nurses (Phippen, 1980). Spielberger (1966) has divided the concept of anxiety into two separate and distinct areas, state anxiety and trait anxiety. State anxiety is characterized by feelings of apprehension accompanied by activation of the sympathetic nervous system. This state is usually in response to a perceived or actual, physical or psychological, threat to the individual.

Activation of the sympathetic branch of the autonomic nervous system is demonstrated by increased heart rate, blood pressure, respiration, temperature, skeletal muscle tension, and sensory perception. All of these increases are undesirable in the surgical patient from an anesthetic viewpoint (Binnings, 1987).

Trait anxiety is a personality characteristic; one of anxiety-proneness that has evolved over time during an individual's life and one that is considered to be

relatively stable. Trait anxiety describes how an individual tends to perceive a stressful situation as being dangerous or threatening and how their response to such situations increases the intensity of their state anxiety reaction (Spielberger, 1983).

Innovative nursing interventions such as the use of music, need to be evaluated for the potential beneficial effects on patient care and outcomes. Music has the capability of producing the positive physiological effects of increasing blood volume, decreasing and stabilizing heart rate, lowering blood pressure, and reducing pain (Harvey and Rapp, 1988).

Chapter 2
Review of Literature
and
Conceptual Framework

The review of literature reveals conflicting results regarding the use of music during the pre/perioperative period.

Music and anxiety in the operative arena

The effect of music on anxiety in preoperative patients was studied by Soyk (1985) who developed an Anxiety Rating Scale (ARS) for the study. The scale consisted of 12 objective observations relating to anxiousness and was completed by the nurse while the subjects were in the surgery holding area. Thirty subjects were divided into four groups, specifically: 1) awake(eyes open)/control; 2) awake/experimental; 3) asleep(eyes closed)/control; and 4) asleep/experimental. The patients in the experimental groups listened to classical music via headphones. The control groups received no intervention. The Neuman Systems Model provided a conceptual framework for Soyk's study. Music was the intervention used for primary prevention. The stressor was surgery. Anxiety, as measured by the ARS, was

considered an indicator of the strength of the flexible line of defense. One way analysis of variance (ANOVA) was performed on the ARS scores which resulted in lack of support for the hypotheses developed. The conclusions of the study suggested: (1) that the instrument (ARS) may not have been a good measurement tool; (2) that music was not an adequate primary prevention; and (3) that replication using a larger sample would be beneficial. Further research was suggested using the State Trait Anxiety Inventory.

Moss (1988) examined the effects of sedative music played during the preoperative period on patients undergoing arthroscopic surgery of the knee. The instrument used to measure pre and postoperative anxiety was Spielberger's State Trait Anxiety Inventory (STAI). Despite the small sample size (N = 17), the hypothesis that patients exposed to music would have lower anxiety levels than those patients not exposed to music was supported by a paired t-test on pre and postoperative scores of both groups. In an earlier write up of the study (Moss, 1987), means were calculated on postoperative State scores and a t-test was performed. This t-test indicated no significant difference in anxiety levels and the hypothesis was not supported. It should be noted that the difference in conclusions were reported by the author in different publications.

Bonny and McCarron (1984) studied the benefits of music as an adjunct to anesthesia. The subjects (N = 25) were

able to listen to music, which was played freely in the operating suite and then administered via headphones after the induction of anesthesia. Data were collected by interview of the subjects. All subjects had positive comments regarding the use of music. Analysis was limited to central tendency. The conclusions from this exploratory study indicate the need for further research on the use of music in the operating room.

Chetta (1981) investigated whether music therapy would help to decrease anxiety in pediatric preoperative patients. Three groups were formed from the sample (N = 75). The control group received only routine preoperative instruction. The first experimental group received preoperative instruction with music added. The second experimental group received the same treatment as the first experimental group and additional music before receiving a preoperative injection. The instruments used were a parent report form and observation of the subjects behavior by the researcher. The behaviors observed were those which indicated a child's avoidance or resistance prior to and during the induction of preoperative medication. The results showed that the second experimental group was less anxious than the other two groups and the null hypothesis was rejected.

Binnings (1987) studied the effect of an auditory distraction (nature tapes) on state anxiety in patients

undergoing regional anesthesia. The 20 subjects were randomly assigned to either the control or experimental group. The STAI was used to measure pre and postoperative anxiety levels. Also measured was the amount of sedation needed by each group. The research hypotheses were supported as the experimental group showed a greater decline in postoperative anxiety scores and required less sedation than the control group.

Updike and Charles (1987) examined the effectiveness of music on improving physiological and emotional status in a preoperative ambulatory setting. The convenience sample of subjects (N = 10) selected either classical or contemporary music and listened to their selection for 30 minutes via headphones preoperatively. Physiologic measurements of heart rate, blood pressure, mean arterial pressure, and double product index were measured before and after the music intervention. All physiologic measurements indicated a statistically significant decrease after the music intervention. Qualitative data were obtained by open-ended question interview which resulted in all subjects stating they enjoyed the music and felt more relaxed. The hypotheses were supported.

The effects of sedative music on anxiety of patients scheduled for arthroscopic surgery was studied by Kaempf and Amodei (1989). The subjects (N = 33) were randomly assigned to one of two groups, experimental or control, with at least

15 subjects in each group. The experimental group was exposed to 20 minutes of classical music, while in the operating room holding area, via a tape player one foot away. The control group did not listen to any music in the holding area. Anxiety was measured by blood pressure, pulse, respiratory rate, and completion of the state portion of the STAI before and after the music intervention or after a 20 minute interval for the control group. Mean differences in scores between groups showed that respiratory rates in the experimental group were significantly lower than the control group. No other measurement showed significant difference.

Steelman (1990) evaluated the effects of intraoperative tranquil music on anxiety and blood pressure in patients having hand surgery under local or regional anesthesia. The convenience sample of 43 subjects were randomly assigned to either a control group or an experimental group. The state portion of the STAI was completed by all subjects preoperatively and within 30 minutes after surgery. Blood pressure was measured before skin preparation and during dressing application. The experimental group listened to their chosen music throughout the surgical procedure. The control group received routine nursing care including verbal distraction. Paired *t*-tests indicated a significant decrease in blood pressure for the experimental group. Both groups showed a significant decrease in anxiety scores but

with no significant differences between the groups.

Stevens (1990) examined how patients, undergoing surgery with a non-general anesthetic, perceived the use of music. The sample (N = 25) was randomly selected from the operating room schedule and interviewed approximately 20 hours postoperatively. Of the 25 patients interviewed, 20 had been given music via headphones to listen to during surgery. Questions concerning the choices of music offered, as well as the use of music as an emotional support were used as a qualitative data collection method. An attitudinal question was also used to measure the degree of helpfulness of the music as perceived by the patient. The results of this question showed that 75 percent of the 20 subjects that received music found it to be very good or excellent in the degree of helpfulness. The qualitative data resulted in positive comments about the use of music but negative comments regarding the choice of music. Participants said the choices were not broad enough and would have liked to have used their own music tapes. The conclusions from this pilot study suggested a need for further research with a larger sample as well as with a greater emphasis on music selection. The use of Spielberger's State Trait Anxiety Inventory was also suggested. The study does offer support for the use of music as an adjunct therapy for non-general anesthetic patients.

Music and anxiety in nonperioperative situations

Music has also been studied in clinical areas outside the operating room. These studies also offer conflicting results.

Durham and Collins (1986) studied the effect of music as a conditioning aid in prepared childbirth education, formerly called Lamaze. The use of medication in labor was used as the measurement of the efficacy of the intervention. There was no difference in the frequency of medication between the control group (n = 15) and the experimental group (n = 15). Despite the failure to reject the null hypothesis the researchers now regularly use music during the childbirth classes as they feel that it helps to create an atmosphere of relaxation. Further research suggestions include the measurement of patient satisfaction with music intervention.

Locsin (1981) studied the effect of music on postoperative pain in female patients having abdominal surgery. The experimental group was exposed to music every two hours for 15 minutes for the first 48 hours after surgery. The results showed that music decreased overt pain reactions during the first 48 hours when compared with the control group. The experimental group also used less analgesia than the control group. Significant limitations of the study were the small sample size (N = 24, 12 per group) and the lack of validity and reliability for the

Overt Pain Reaction Rating Scale.

The physiologic responses of coronary care patients to music have been studied by Davis-Rollans and Cunningham (1987) to determine if playing music in a Coronary Care Unit (CCU) was contraindicated. They measured heart rate and rhythm by EKG and respiratory rate by Brush Gould bellows pneumograph. The measurements were taken for 42 minute periods. The experimental period occurred with the subject listening to music via headphones. The control period occurred with the subjects wearing headphones but without music. A psychological questionnaire was also administered to the subjects (N = 24), although no validity or reliability was offered for that instrument. The findings evaluated by ANOVA, showed no significant change in physiologic variables which supported the hypothesis that music in the CCU would not be contraindicated. The psychological questionnaire also suggested music to be beneficial for CCU patients.

The effect of music on postoperative pain and anxiety was examined by Mullooly, Levin, and Feldman (1988). The subjects (N = 28) who were scheduled for elective abdominal hysterectomy, were randomly assigned to one of two groups; the experimental group which received music and the control group which did not receive music. The first and second evenings after surgery the investigator had subjects rate their pain by a visual analog Pain Rating Scale and their

anxiety by a five point Graphic State Anxiety Scale. It was stated that both scales have been shown to be valid but no reliability was offered for either scale. After these measurements were obtained, the experimental group listened to 10 minutes of easy listening music via headphones. The control group received no intervention. The scales were completed again after the 10 minute period. ANOVA with repeated measures showed that pain scores for the second day and anxiety scores for both days were significantly lower in the experimental group. These results supported the premise that music may help to decrease postoperative pain and anxiety.

The effects of relaxing music on state anxiety in myocardial infarction patients was examined by Lueders Bolwerk (1990), using the State Trait Anxiety Inventory (STAI). The subjects (N = 40), who all had baseline state anxiety scores of greater than 40, were randomly assigned to either the experimental group or the control group. The subjects in the control group completed the STAI within the first 48 hours of admission and then again on the third or fourth day of hospitalization. The subjects in the experimental group completed the STAI within the first 48 hours of admission, received 22 minutes of classical music each day for three consecutive days then completed the STAI at the end of the third music session. The mean post-treatment anxiety scores revealed a statistically

significant t value between the groups supporting the hypothesis that the group listening to music would have lower state anxiety scores.

Updike (1990) studied the effectiveness of selected music programs in creating an improved physiologic and emotional status of patients in Intensive Care Units (ICU). The subjects (N = 20) listened to 30 minutes of music selected from one of eight programs consisting of classical or contemporary music via headphones. Measurements recorded before and after the music intervention were: 1) heart rate; 2) blood pressure; 3) mean arterial pressure (MAP); 4) double product index (DPI) (the product of heart rate and systolic blood pressure divided by 100); 5) EKG rhythm strip; and 6) pain medication dosage. No description of method or instruments for obtaining these measurements was offered. Qualitative data were obtained by use of an open-ended questionnaire containing five questions based on the Emotional Condition Rating Scale (ECRS) for which no validity or reliability were offered. A significant decrease from pre- to post-test measures in systolic blood pressure, MAP and DPI were revealed by use of paired t-test analysis. The results of the qualitative data analysis indicated decreased anxiety and depression and diminished pain response.

Music and imagery in nonoperative situations

Music has been studied in conjunction with other interventions such as imagery, primarily in nonoperative situations.

Geden, Lower, Beattie, and Beck (1989) reported the results of two studies which examined the effects of music and imagery on simulated labor pain (Forgione-Barber pain stimulator). The first study was performed to assess the effects of different types of music on self-reported pain and physiological measures (blood pressure, pulse, and respirations). The sample population (N = 50) was randomly assigned to one of five different music type groups: 1) easy listening music; 2) rock music; 3) self-selected music; 4) a dissertation (placebo-attention); and 5) no treatment control. A post treatment questionnaire regarding the music was completed by the subjects. All subjects stated that they liked and listened to the music. There were no significant differences in self-report pain ratings between the groups. No statistically significant effects were found to support music type but the subjects that listened to easy listening music had the lowest mean self-report pain ratings.

The second study (Geden, et al., 1989) examined the effects of music and imagery on self-reported pain and physiological measures. The sample (N = 50) was randomly assigned to one of five groups: 1) music and self generated

imagery; 2) music and guided imagery; 3) no music and self generated imagery; 4) no music and guided imagery; and 5) a non treatment control group. A post treatment questionnaire was given to the subjects. All music subjects (n = 20) stated that they listened to the music and 18 of these reported that they liked the music. There was no significant difference between groups on physiological measures. Ninety three percent of the treated subjects reported having used the techniques that they had learned during actual labor. No significant group effects were reported.

Frank (1985) studied the effect of music therapy combined with guided visual imagery on cancer patients suffering from chemotherapy induced nausea and vomiting. The nursing intervention of music via tape recorder and visual imagery via a wall poster were administered 15 minutes before chemotherapy and continued for two hours. The STAI and a questionnaire developed for the study concerning nausea and vomiting patterns were administered before the intervention and after the two hour period when the chemotherapy infusion was complete. The conclusions drawn by the researcher were that music and visual imagery are beneficial interventions to decrease anxiety and length of chemotherapy induced nausea and vomiting. No validity or reliability were offered for the nausea and vomiting questionnaire.

Other studies involving music as an intervention

Zimmerman, Pierson, and Marker (1988) studied the effects of music and suggestion on anxiety levels of patients in a coronary care unit (CCU). A convenience sample (N = 75) of patients admitted to the CCU with a diagnosis of suspected myocardial infarction were randomly assigned to one of three groups. The groups were 1) experimental group which listened to music; 2) control group which was allowed uninterrupted rest; and 3) experimental group which listened to white noise (synthetic silence). The suggestion for all subjects was to lie quietly in bed. The State Trait Anxiety Inventory was administered prior to and after the intervention. Physiological measurements of blood pressure, heart rate, and digital skin temperature were measured prior to the intervention and every ten minutes during the 30 minute intervention. Validity and reliability of all measurement tools was provided. No statistical difference was found among the groups on state anxiety scores by ANCOVA. Statistically significant differences in physiological measurements over time did exist for all subjects as a total group. Blood pressure and heart rate decreased and skin temperature increased. Neither music nor synthetic silence was shown to be any different than uninterrupted rest in producing the desired effects on physiological measurements.

A study conducted by Cotanch and Strum (1987) compared progressive muscle relaxation (PMR) versus a placebo control (music listening) as antiemetic therapy for cancer patients. The subjects (N = 60), who were patients receiving the initial course of a multi-course chemotherapy with an emetogenic potential of greater than 60%, were randomly assigned to one of three groups. The PMR group received a 20 to 30 minute audio tape explanation of the head to toe relaxation technique along with a descriptive pamphlet. The placebo control group listened to 22 minutes of relaxing music. The true control group received no intervention. Subjects in the experimental group and the placebo control group were instructed to listen to their tapes twice per day and again while receiving chemotherapy. The instruments used were:

1) Duke Descriptive Scale (DDS), a self-assessment for nausea and vomiting activity with accepted validity and reliability; 2) patient account food and fluid diary for two days after chemotherapy which provided caloric intake; 3) Lange Skin Fold Caliper to assess weight loss; 4) blood pressure; 5) pulse rate; 6) respirations; and 7) STAI. Results of the study showed statistically significant differences in pre to post treatment blood pressure and pulse rate in both the PMR and placebo control groups by use of the Spearman Rank Correlation Coefficient. Weights and skin caliper measurements did not significantly change

between groups. The investigator suggests that PMR can be an effective intervention for improving side effects of chemotherapy but that the music listening was not a strong enough distraction to improve side effects.

Guzetta (1989) examined the effects of relaxation and music therapy on patients in a CCU with the presumptive diagnosis of acute myocardial infarction. The subjects (N = 80) were randomly assigned to one of three groups. Specifically, 1) music therapy group, 2) relaxation therapy group or 3) control group. The relaxation technique used was a standardized head-to-toe relaxation script which the investigator or research assistant guided the patient through, followed by repetition of the word "one". The music therapy group also received the relaxation intervention followed by 20 minutes of music via headphones, which had been selected by the subjects. The choices of music were: 1) soothing classical; 2) soothing popular; and 3) nontraditional music (no vocalization or meter, periods of silence, and asymmetric rhythm). The control group received routine nursing care and no specific intervention. Subjects assigned to the experimental groups participated in the interventions for 20 minutes twice a day for a total of three sessions over a two day period. Stress was measured by auscultation of apical heart rate for one minute, peripheral temperatures by mercury bulb finger thermistors, and by incidence of cardiac complications during the study.

Heart rate and temperature were obtained before and after each intervention for the experimental groups and at the same intervals for the control group. Qualitative data were also obtained using open ended questions about the interventions. Incidence of cardiac complications were recorded on a flow sheet. Relaxation and music therapy were concluded to be more effective in lowering apical heart rates than no intervention as shown by ANOVA. During analysis of data over time the ANOVA was also significant for the experimental groups. ANOVA analysis of peripheral temperatures also revealed significant differences between both experimental groups and also revealed that music therapy was more effective than relaxation alone. The control group had a higher cardiac complication rate than the experimental groups. The results of the qualitative data revealed that all subjects in the experimental groups found the interventions helpful.

There exists a vast amount of literature concerning the use of music as a therapy for patients with various types of psychiatric and psychological difficulties. The literature available in this area was not explored, as the target population for the study did not include patients being treated for these types of problems. Music, in this study, was used as a nursing intervention as opposed to as a specific treatment modality within the context of therapy for psychiatric and psychological disorders.

The conflicting results offered in the various clinical areas indicate that further study of music as a nursing intervention need to be pursued. The use of music in the operative arena was supported in studies reported by Moss (1988), Bonny and McCarron (1984), Chetta (1981), Binnings (1987), Updike and Charles (1987), Kaempf and Amodei (1989), Steelman (1990), and Stevens (1990). The studies which did not support the use of music in the operative arena were Soyk (1985) and Moss (1987). The use of music in nonoperative situations was supported in studies reported by Locsin (1981), Davis-Rollans and Cunningham (1987), Mullooly, Levin, and Feldman (1988), Lueders Bolwerk (1990), and Updike (1990). The study which did not lend support to the use of music in a nonoperative situation was Durham and Collins (1986). The use of music in conjunction with other interventions was supported in studies reported by Frank (1985), Cotanch and Strum (1987), and Guzetta (1989). Music use, in combination with other interventions, was not supported in the studies reported by Zimmerman, Pierson, and Marker (1988), and Geden, Lower, Beattie, and Beck (1989).

The advantages of music as an intervention are that it is noninvasive, does not interact with pharmacologic agents, and has no adverse side effects (Updike, 1990).

Conceptual Framework

Nursing Model

The Neuman Systems Model provided a conceptual framework on which to base the study. The main focus of the model is on the individual client as a total being and their reaction to stressors. Neuman uses Hans Selye's definition of stressors as, "tension-producing stimuli with the potential of causing disequilibrium" (Neuman, 1989, p. 23). Utilizing this definition, impending surgery is viewed as a stressor.

According to Neuman (1989), the flexible line of defense is an individual's first protective buffer against the impact of stressors. This line is considered to be dynamic and capable of rapid change. The flexible line of defense is made up of components of the five variables (physiological, psychological, sociocultural, developmental, spiritual) that are consistent throughout the model. Some variables specific to the function of the flexible line of defense are coping patterns, life-style, and the influence of belief systems. Anxiety level can be viewed as one of the variables which impacts the strength of the flexible line of defense.

The normal line of defense is the next barrier to stressors conceptualized by Neuman. It is considered to be the state to which a client has evolved over time or the

usual level of wellness. It is also capable of change but at a much slower rate than the flexible lines of defense. The normal line of defense is also impacted by the five variables.

The lines of resistance are considered to contain known and unknown internal factors which support the client's basic structure, normal line of defense, and protects the integrity of the system. If the lines of resistance are effective in fighting off the stressor, the system will reconstitute. The core consists of basic survival factors and energy resources. These factors and resources are; normal temperature range, genetic structure, response pattern, organ strength, weakness, ego structure, and knowns or commonalities (Neuman, 1989). If the lines of resistance are ineffective in fighting the stressor, the core will be penetrated and the system will suffer energy depletion and death.

Prevention as nursing interventions can occur at the primary, secondary, or tertiary level. "Primary prevention as intervention is provided when the degree of risk or hazard is known but a reaction has not yet occurred" (Neuman, 1989, p. 35). The purpose of primary prevention is to protect the client's normal line of defense or to strengthen the flexible line of defense. "At the level of primary prevention, a nurse can intervene before a reaction has occurred" (Hoch, 1987, p. 13). The use of sedative

music in the pre/perioperative period will be the primary prevention nursing intervention applied. The goal of this intervention will be to strengthen the client's flexible line of defense and decrease the state anxiety level of the subjects in the experimental group.

To summarize, the components of Neuman's Model of concern in the study include stressor (arthroscopic knee surgery), lines of defense (anxiety levels), and primary prevention (sedative music). These components of the model have been tested previously with conflicting results.

Ziemer (1983) studied the effects of preoperative information on postoperative coping. The subjects (N = 111) were randomly assigned to one of three groups. The first group received a five and one half minute tape consisting of procedural information. The second group received a nine and one half minute tape consisting of procedural and sensory information. The third group received a 22 minute tape consisting of procedural, sensory, and coping strategy information. The instruments used in the study were: 1) Physical Coping Behavior Scale which showed content validity and test-retest reliability; 2) Psychophysiologic Coping Behavior Scale which showed content validity and test-retest reliability; 3) Physical symptoms; 4) Pain Intensity Scale which had face validity but no reliability reported; and 5) Distress Scale which had face validity but no reliability reported. The data did not support the hypotheses derived

from the model regarding primary prevention strengthening the lines of defense.

Another study by Soyk (1985) also did not support the hypotheses that primary prevention, in this case sedative music, would strengthen the lines of defense (decrease anxiety levels). The instrument used in this study was subjectively completed by the nurse and showed only content validity. The sample (N = 30) was divided into four groups.

A study by Louis, Jacobs, and Schneider (1986) did support the hypotheses derived from Neuman's model. This study showed that primary prevention in the form of group interaction did strengthen the flexible line of defense by reducing anxiety levels of nurses working with long term clients. The limitation of this study was small sample size (N = 15).

The conflicting results in these studies indicate the need for further testing of the Neuman Systems Model in clinical practice.

Assumptions of the Study

1. The sample desired will be available and willing to participate.
2. Arthroscopic knee surgery will be considered a stressor by the subjects.
    a. Preoperative patients will have increased state anxiety levels.

b. Preoperative patients will have increases in the physiological measurements of blood pressure, heart rate, and respiratory rate from their normal baseline levels.

3. The State Trait Anxiety Inventory will provide an accurate measure of anxiety levels and subjects will complete the STAI truthfully.
4. Increase in physiological measurements (blood pressure, heart rate, and respiratory rate) are indicative of autonomic nervous system activation.
5. The Neuman Systems Model is an adequate nursing conceptual framework for use in this study.

Hypotheses

The problem of increased anxiety in patients, preoperatively as well as in other clinical areas, has been thoroughly reviewed. The use of music, as a nursing intervention, to help decrease anxiety has been supported in a number of studies (Moss, 1988; Chetta, 1981; Binnings, 1987; Updike and Charles, 1987; Locsin, 1981; Frank, 1985; Mullooly, Levin, and Feldman, 1988; Guzetta, 1989; Lueders Bolwerk, 1990; and Updike, 1990). The review of literature has resulted in the development of the following hypotheses.

1. Patients undergoing out-patient arthroscopic knee surgery who receive sedative music during the perioperative period will have lower postoperative state anxiety scores than patients who do not receive sedative music.
2. Patients undergoing out-patient arthroscopic knee surgery who receive sedative music during the perioperative period will have a greater decrease in postoperative systolic blood pressure than patients who do not receive sedative music.
3. Patients undergoing out-patient arthroscopic knee surgery who receive sedative music during the perioperative period will have a greater decrease in postoperative diastolic blood pressure than patients who do not receive sedative music.
4. Patients undergoing out-patient arthroscopic knee surgery who receive sedative music during the perioperative period will have a greater decrease in postoperative heart rate than patients who do not receive sedative music.
5. Patients undergoing out-patient arthroscopic knee surgery who receive sedative music during the perioperative period will have a greater decrease in postoperative respiratory rate than patients who do not receive sedative music.

Operational Definitions

Arthroscope: an instrument designed for magnification of a joint. The instrument is 5mm in diameter and approximately 16cm long.

Arthroscopic knee surgery: a surgical procedure performed while the patient is under general anesthesia, consisting of examination of the knee joint, via an arthroscope, through two to four quarter inch incisions at the joint line, through which certain orthopaedic conditions can be improved or corrected.

Out-patient surgery: also called same-day surgery. The patient does not spend the night in the hospital. The patient is admitted to the Ambulatory Surgery Unit (ASU), the surgery is performed, and the patient is discharged from the ASU the same day.

Sedative music: soothing, calming music with tempos ranging from 60 to 80 beats per minute and with low pitch (Cook, 1981).

Preoperative period: the time period beginning when the subject arrives at the Ambulatory Surgery Unit (ASU) of the hospital on the morning of surgery and ending when the subject begins transport to the surgery department.

Perioperative period: the time period beginning when the subject begins transport to the surgery department and ending with the onset of transport from the Post Anesthesia

Care Unit (PACU).

Postoperative period: the time period beginning with transport from the PACU and ending with discharge from the ASU.

State anxiety: feelings of apprehension accompanied by activation of the autonomic nervous system, measured by heart rate, blood pressure, respirations, and the state portion of the State Trait Anxiety Inventory (STAI).

Trait anxiety: a personality characteristic of anxiety-proneness measured by the Trait portion of the STAI.

Physiologic measurements: observable measurements of activity of the autonomic nervous system. This will include blood pressure, heart rate, and respiratory rate.

Blood pressure: the pressure of blood within the arteries measured by the DINAMAP(TM) Vital Signs Monitor.

Systolic pressure: the first beat measured during the contraction phase of the heart.

Diastolic pressure: the last beat measured which occurs during the relaxation phase of the heart.

Heart rate: the beat of the heart felt through the walls of the arteries measured by the DINAMAP Vital Signs Monitor.

Respiratory rate: the number of times an individual inhales during one minute measured by direct observation of chest and/or abdominal movement.

Chapter 3

Methodology

Research Design

The research design selected for the study was the quasi-experimental design. True experimental design requires manipulation of the independent variable, randomization, and control (Polit and Hungler, 1987). True randomization cannot be performed within the constraints of the study. Many extraneous variables cannot be controlled when dealing with human subjects in the hospital setting. These considerations indicate the use of quasi-experimental design due to the attempt to infer a cause and effect relationship between variables.

Research Setting

The study was conducted at a 400 bed teaching hospital in the southwest. The hospital units involved in the study were the Ambulatory Surgery Unit (ASU) and the Surgery Department. The ASU is located across the hall from the Surgery Department. The ASU is where the patients are admitted, an initial nursing assessment is conducted, and preparation for surgery is begun. The nurses in the ASU

care for approximately 25 patients each day. The Surgery Department consists of the holding area, the operating suites, and the Post Anesthesia Care Unit (PACU). The holding area is a small room located near the entrance to the department. The holding area is where patient assessments are performed by the perioperative nurse and the anesthesiologist. The operating suite is the room where the surgical procedure takes place. The PACU is where recovery of the patient begins after surgery. The personnel in the Surgery Department care for approximately 42 patients each day. Surgical attire is worn by all personnel in the Surgery Department.

Sample

Criteria for sample selection

The subjects for the study were from the practice of one orthopaedic surgeon in an urban city in Southern Nevada. The rationale for using patients from only one surgeon's practice was to help to control the extraneous variables of surgical technique and preoperative instruction. The subjects were scheduled for elective arthroscopic knee surgery and met the following criteria. They fell within the age range of 21 to 65. They were free of hearing impairments and capable of reading and writing English. The subjects were not under the care of a physician for

hypertension or cardiac problems or taking any antihypertensive or cardiac medications. All patients meeting the above criteria were asked if they would like to participate in the study. They were told that there was no penalty for not participating. A disadvantage of using patients from only one surgeon's practice was that the sample may not be representative of the population. However, this sampling helped to control for the extraneous variable of preoperative instruction, as the investigator provides the preoperative information to all subjects. The preoperative information consisted of two booklets about arthroscopy (Appendices A and B) as well as a detailed description of the procedure utilizing a knee model and surgical instruments (Appendix C).

Nature and size of the sample

The sample size was 23, which was the number of subjects obtained during a ten month period of data collection. The sample was divided into two groups, control (n = 11) and experimental (n = 12). The experimental group was given the primary prevention of sedative music (independent variable) when they began transport from the ASU to the surgical area, approximately 30 to 45 minutes prior to the impact of the stressor (surgery). The subjects chose their music from among five selections. The choices were one classical tape, one easy-listening popular tape,

one easy-listening movie soundtracks tape, one country-western tape, and one nontraditional music tape consisting of ocean sounds. The subjects were then instructed to listen to the music throughout the surgical experience. The control group received the routine nursing care given to all arthroscopic knee surgery patients.

Elective surgeries are performed two days per week. It would have been difficult to separate the sample into control and experimental groups on the same surgical day as they were all in the same preoperative area. The deprivation of the intervention to the control group could have had an effect on the results. Therefore, random assignment to groups was done by surgical day. A coin-flip that was done when the first subject was identified indicated placement into the control group. Thereafter, subjects were placed in alternating groups.

Human Subject Rights

Approval for the study was obtained from the Human Subject Rights Committee at the University of Nevada, Las Vegas as well as from the institutional review board where data collection took place.

Once a subject was identified and verbally agreed to participate in the study an informed consent was obtained by the investigator. This was done the day prior to surgery as there were different consent forms for control and

experimental groups (Appendices D and E). The consent forms were stored by the investigator in a locked file. Confidentiality was protected by assigning code numbers to the subjects' data forms.

Data Collection Methods

Techniques

The physiologic measurements of blood pressure, heart rate, and respirations were observed, recorded, and examined for the study at either five or six intervals. The initial measurements were recorded the day the subject was scheduled for surgery, immediately after agreeing to participate. The second measurement was obtained the day prior to surgery after signing the consent form. The third measurement was recorded after admission to the ASU. The fourth measurement was recorded during surgery after 30 minutes of general anesthesia. The fifth measurement was obtained on admission to the PACU. The final measurement was recorded just prior to discharge from the ASU.

The Spielberger State Trait Anxiety Inventory (STAI) was administered preoperatively upon admission to the ASU. The STAI was administered again postoperatively just prior to discharge from the ASU.

Instruments

The measurement tool that was selected for use in this study was Spielberger's State Trait Anxiety Inventory (STAI). The STAI is a self report scale consisting of 40 items. There are 20 items on the S-Anxiety scale which indicate how an individual feels "right now" (Appendix F). The T-Anxiety scale consists of 20 items which evaluate how an individual "generally" feels (Appendix G). The development of the STAI began in 1964 and was available for general research use in 1970 as Form X. The STAI was revised in 1980 (Form Y) in which weaker items were replaced with items that were more consistent with the concepts being measured.

Reliability of the STAI has been evaluated in terms of stability and internal consistency. Stability, as measured by test-retest coefficients, is relatively high for the T-Anxiety scale (.65 to .86) and low for the S-Anxiety scale (.16 to .62, median =.33) as would be expected for a measure assessing changes in anxiety resulting from situational stress (Spielberger, 1983). The sample size for the test-retest was approximately 500. Internal consistency was measured using the alpha coefficient, with a sample size of approximately 5,000. All alpha coefficients were greater than .89. Item-remainder correlation coefficients for the S-Anxiety Scale had a median range from 55 to 65 and for the T-Anxiety Scale from 49 to 60.

Validity of the STAI has been evaluated in terms of concurrent, convergent, divergent, and construct validity. Construct validity of the T-Anxiety scale was evidenced using contrasted groups by comparing mean scores of psychiatric patients who had anxiety as a major symptom (M = 46.62, N = 461) with normal subjects (M = 34.57, N = 1,838).

Evidence of the construct validity of the S-Anxiety scale was observed in the scores of military recruits, who were tested shortly after they began a highly stressful training program (M = 45.53, N = 1,969) as compared to subjects tested under non-stressful conditions (M = 38.80, N = 1,279). Further evidence of the construct validity of the S-Anxiety scale was noted in the scores of students under examination conditions (M = 57.75, N = 977) compared with normal classroom conditions (M = 39.69, N = 977) (Spielberger, 1983).

The correlations between the S-Anxiety and the T-Anxiety scale yielded correlations ranging from .59 to .75. In general, persons high in T-Anxiety tend to be higher in S-Anxiety even in neutral situations.

The T-Anxiety scale has been correlated with other scales which measure trait anxiety, the IPAT Anxiety Scale and the Taylor Manifest Anxiety Scale (TMAS). The reliability correlations ranged from .73 to .85. These three scales are considered essentially equivalent measures of T-Anxiety.

The STAI has been correlated with many other measures of personality to support evidence of convergent and divergent validity. Generally speaking, larger correlations were noted with personality tests that were measures of emotional disturbance and smaller correlations were noted with unrelated constructs.

The STAI has been used in over 2,000 research studies to date (Spielberger, 1983). The consistent validity and reliability of the STAI made it an appropriate choice for the measurement of anxiety in this study.

One disadvantage of using a pencil and paper measurement tool is that subjects may answer in a manner that they believe the researcher desires. To overcome this disadvantage, the researcher must first develop a rapport with the subjects and encourage honesty in responses.

As anxiety has been associated with stimulation of the autonomic nervous system, the physiologic measures of blood pressure, heart rate, and respiratory rate were included in this study as an adjunct to the STAI.

Systolic and diastolic blood pressure, and heart rate were measured by the DINAMAP Vital Signs Monitor Model 8100 manufactured by Critikon. In a two hospital study, Critikon (1986) compared DINAMAP values to central aortic blood pressure values to establish validity of the device. Adult male patients undergoing cardiac catheterization were studied according to the method described by the American

Association of Medical Instrumentation (AAMI). The AAMI guidelines require a mean difference ±5mmHg and Standard Deviation (SD) 8mmHg. In 185 patients, the systolic blood pressure reading showed a mean difference of -2.0mmHg and a SD of 3.5. In 184 patients, the diastolic blood pressure reading showed a mean difference of -0.5mmHg and a SD of 2.7. In 187 patients, the heart rate reading showed a mean difference of -1.0mmHg with a SD of 2.5. The negative value indicates the DINAMAP values lower than aortic values.

The reliability of the DINAMAP was studied by Ramsey (cited in Critikon, 1986) in a series of 28 studies involving 17 human subjects with intra-arterial catheters. The averaged mean errors from the 28 studies resulted in an overall mean error of -0.23mmHg with a SD of 4.21mmHg. The correlation coefficient was 0.98.

The DINAMAP Vital Signs Monitor has been used in over 60 studies and is considered to be a valid and reliable instrument for the measurement of systolic and diastolic blood pressure, and heart rate.

Respiratory rate was determined by objective evaluation by the nurse. Validity and reliability was established with dual assessment of a subject, with respiratory rate measured for one minute by the researcher and one nurse per unit. This was performed with the first two subjects. As measurements were taken in four separate units, different nurses were involved throughout data collection.

Procedure

Baseline measurements of blood pressure, heart rate, and respiratory rate were obtained in the orthopaedic surgeon's office when the subject agreed to participate in the study, usually two to three weeks prior to the scheduled surgery date. On the day prior to surgery, informed consent was obtained by the researcher. The blood pressure, heart rate, and respiratory rate were recorded. If the subject was in the experimental group their musical preference was identified from the following selections: one classical music tape; one easy-listening popular music tape; one easy-listening movie soundtracks tape; one country-western music tape; and one nontraditional music tape consisting of ocean sounds.

On the morning of surgery, on admission to the ASU, the subjects were asked to complete the STAI and a demographic data form (Appendix I). Physiologic measurements were again obtained. The recording of these measures was already routine in the ASU. The subjects in the experimental group were then given a cassette tape player, equipped with auto-reverse, containing the sedative music of their choice and a set of headphones with disposable foam ear pieces. The subjects were instructed to put on the headphones and start the tape when they began transport to the Surgery Department. The subjects were instructed to listen to the music at a volume that was comfortable for them. Subjects

were able to pause the music whenever necessary, for example when speaking to the perioperative nurse or the anesthesiologist.

The subjects in the control group were given routine nursing care for arthroscopic knee surgery patients.

After 30 minutes of general anesthesia the physiologic measurements of blood pressure, heart rate, and respirations were again recorded. These physiologic measurements were again obtained upon admission of the subjects to the PACU. Patient's in the experimental group were instructed to stop the music upon postoperative arrival in the ASU.

Just prior to discharge from the ASU, the State portion of the STAI was re-administered and physiologic measurements obtained for the final reading. Prior to re-administration of the STAI, level of awareness was assessed by reality orientation questions. The subjects were then asked to respond to questions regarding music. Subjects in the experimental group were asked, "Do you feel that the music helped you to be more relaxed?" (Appendix H). Subjects in the control group were asked, "Do you feel that music may have helped you to feel more relaxed?" (Appendix H). Directional questions, rather than open-ended questions were preferred here because a yes/no response was desired for data collection. In addition, an area for subject's comments was provided.

Chapter 4

Results

Demographic data

The sample of arthroscopic knee surgery patients in the study consisted of 23 adults ranging in age from 21 to 65 years of age (Table 1). The subjects were randomly placed into one of two groups. The experimental group (n = 12) received music as a primary prevention. The control group (n = 11) did not receive music. Independent t-test results showed no significant difference between the two groups in mean age (Table 2). The total sample was evenly divided between males (n = 12) and females (n = 11) (Table 3). The two groups also had an even distribution by gender. The control group consisted of six males and five females. The experimental group consisted of six males and six females.

In addressing the variable of marital status, it was observed that a majority (81.8%) of the control group was married (Table 4). Frequency distributions revealed that the majority (73.9%) of the sample were Caucasian (Table 5). Educational background was varied, ranging from grade school to college degree (Table 6).

Table 1

Histogram of Treatment Groups by Age

Combined Groups N = 23

Age Range

```
21 to 29 |********************5
30 to 39 |****************************7
40 to 49 |********************************8
50 to 59 |********2
60 to 65 |****1
---------|-------+-------+-------+-------+-------+
Number   0       2       4       6       8       10
```

Music Group n = 12

Age Range

```
21 to 29 |************3
30 to 39 |************************6
40 to 49 |****1
50 to 59 |********2
60 to 65 |
---------|-------+-------+-------+-------+-------+
Number   0       2       4       6       8       10
```

Non-Music Group n = 11

Age Range

```
21 to 29 |********2
30 to 39 |****1
40 to 49 |****************************7
50 to 59 |
60 to 65 |****1
---------|-------+-------+-------+-------+-------+
Number   0       2       4       6       8       10
```

Table 2

Independent t-Tests of Music and Non-Music Groups on Age Range

Group	n	Mean Age Range	SD	t	p*
Music	12	2.1667	1.030	1.26	.221
Non-Music	11	2.7273			

Age Range: 20 to 29 = 1
30 to 39 = 2
40 to 49 = 3
50 to 59 = 4
60 to 65 = 5

*p value two-tailed

Table 3

Frequency Distribution for Music and Non-Music Groups by Gender

Gender	Combined n	Combined %	Music n	Music %	Non-Music n	Non-Music %
Male	12	52.2	6	50.0	6	54.5
Female	11	47.8	6	50.0	5	45.5
Total	23	100	12	100	11	100

Table 4

Frequency Distribution for Music and Non-Music Groups by Marital Status

	Combined		Music		Non-Music	
Status	n	%	n	%	n	%
Single	6	26.1	5	41.7	1	9.1
Married	14	60.9	5	41.7	9	81.8
Divorced	3	13.0	2	16.7	1	9.1
Total	23	100	12	100	11	100

Table 5

Frequency Distribution for Music and Non-Music Groups by Ethnic Origin

	Combined		Music		Non-Music	
Ethnicity	n	%	n	%	n	%
Caucasian	17	73.9	8	66.7	9	81.8
Hispanic	3	13.1	2	16.7	1	9.1
Black	2	8.7	1	8.3	1	9.1
Amer.Indian	1	4.3	1	8.3	0	0.0
Total	23	100	12	100	11	100

Table 6

Frequency Distribution for Music and Non-Music Groups by Educational Background

	Combined		Music		Non-Music	
Education	n	%	n	%	n	%
Grade School	2	8.7	2	16.7	0	0.0
Some HS	1	4.3	0	0.0	1	9.1
HS Diploma	6	26.2	2	16.7	4	36.3
Tech.School	2	8.7	1	8.3	1	9.1
Some College	11	47.8	6	50.0	5	45.5
College Degree	1	4.3	1	8.3	0	0.0
Total	23	100	12	100	11	100

HS = high school

Previous surgery was experienced by all but one of the subjects, with the number of prior surgeries ranging from one to greater than five operative procedures. Nearly twenty percent had experienced surgery within the last year (Table 7). Subjects were asked to list the types of surgical procedures that they have experienced (Appendix I). The researcher grouped the responses into four general medical specialty categories (Table 8).

Music listening habits were assessed to determine if music ordinarily played any part in the daily life of the subjects. The majority (73.9%) of the subjects stated that they listened to music daily (Table 9). The types of music enjoyed by the subjects were also examined (Table 10).

Homogeneity of the readings of the blood pressure, respiratory rate, and heart rate were assessed between groups by using independent *t*-tests. The mean systolic blood pressure for the experimental group was 125.08 mmHg. The mean systolic blood pressure for the control group was 119.00 mmHg. Although a difference of 6.08 mmHg existed between the groups, this was not a significant difference (Table 11). The mean diastolic blood pressure for the experimental group was 80.42 mmHg, and for the control group 76.64 mmHG. The mean respiratory rate for the experimental group was 19.33, and for the control group 19.45. Neither of these measures were significantly different (Table 11). However, the mean heart rate for the experimental group was

Table 7

Frequency Distribution for Music and Non-Music Groups by Occurrence of Number of Prior Surgical Procedures (OR's) and Time Span Since Last Surgery

	Combined		Music		Non-Music	
# prior OR's	n	%	n	%	n	%
zero	1	4.3	0	0.0	1	9.1
one	5	21.8	3	25.0	2	18.2
2 to 5	15	65.2	7	58.3	8	72.7
> 5	2	8.7	2	16.7	0	0.0
Total	23	100	12	100	11	100
Last OR occurred						
<12 months	4	17.4^	2	16.7	2	18.2^
1 - 2 yrs	3	13.0^	1	8.3	2	18.2^
3 - 5 yrs >	15	65.2^	9	75.0	6	54.5^
Total	22^	95.6^	12	100	10^	90.9^

yrs = years ^ = missing data

Table 8

Numbers and Categories of Surgical Procedures Experienced by Subjects

Categories	Combined n*	Music n	Non-Music n
Orthopaedic	11	7	4
General	7	3	4
Gynecological	8	4	4
Other	11	6	5
Total	37	20	17

*n = number of previous surgical procedures stated by subjects for each category

Other = urological, ENT (ears, nose, throat), oral

Table 9

Frequency Distribution for Music and Non-Music Groups by Music Listening Habits

	Combined		Music		Non-Music	
Listen to music	n	%	n	%	n	%
Daily	17	73.9	10	83.3	7	63.6
5 - 6 days/wk	1	4.3	0	0.0	1	9.1
2 - 4 days/wk	5	21.8	2	16.7	3	27.3
Total	23	100	12	100	11	100
If daily, # of hours^						
< 1	2	8.7	1	8.3	1	9.1
1 - 3	11	47.8	5	41.7	6	54.5
4 - 5	1	4.3	1	8.3	0	0.0
> 8	2	8.7	2	16.7	0	0.0
Total	16	69.5	9	75.0	7	63.6

^ = missing data

Table 10

Frequency Distribution for Music and Non-Music Groups by Types of Music Enjoyed by Subjects

	Combined		Music		Non-Music	
Types^ of Music	n	%	n	%	n	%
Classical	13	56.5	6	50.0	7	63.6
Country/Western	12	52.2	5	41.7	7	63.6
Reggae	2	8.7	0	0.0	2	18.2
Jazz	9	39.1	5	41.7	4	36.4
Heavy Metal	2	8.7	1	8.3	1	9.1
Soft Rock	17	73.9	10	83.3	7	63.6
Hard Rock	6	26.1	3	25.0	3	27.3
Rap	2	8.7	1	8.3	1	9.1
Folk	1	4.3	0	0.0	1	9.1
Oldies	15	65.2	6	50.0	9	81.8
Other	1	4.3	1	8.3	0	0.0

^ = subjects encouraged to choose as many types as enjoyed

Table 11

Pre-treatment Independent t-Tests of Group Differences for the Variables of Blood Pressure, Respiratory Rate,and Heart Rate Between Music and Non-Music Groups

Music group n = 12
Non-Music group n = 11

Variable	Mean	SD	t	p*
Systolic Blood Pressure				
Music	125.08	19.37	-0.90	.188
Non-Music	119.00	11.60		
Diastolic Blood Pressure				
Music	80.42	7.28	-1.36	.09
Non-Music	76.64	5.90		
Respiratory Rate				
Music	19.33	3.23	0.11	.45
Non-Music	19.45	1.57		
Heart Rate				
Music	75.33	12.86	-2.05	.029
Non-Music	67.00	5.53		

*p value one-tailed

75.33, and for the control group 67.00 and was significantly lower than the experimental group (t = -2.05, p = .029) (Table 11). As a significant difference was found on the pre-treatment measurement of heart rate, the baseline measurements, taken the day prior to surgery, were also evaluated by independent t-test. The mean heart rate for the experimental group was 77.5. The mean heart rate for the control group was 77.0. The results of the t-test showed no significant difference between the groups (t = .10, p = .46) the day prior to surgery.

Hypotheses

Hypothesis (H1) of whether arthroscopic knee surgery patients who receive sedative music during the perioperative period will have lower postoperative state anxiety scores than patients who do not receive sedative music, was evaluated between the groups by independent t-test. The mean postoperative state anxiety score for the experimental group was 32.25, and the mean for the control group was 31.73 (Table 12). There was no significant difference between the groups (t = -.11, p = .456) (Table 12). To assess for similarity of groups pre-treatment, independent t-tests were conducted on the state and trait anxiety scores. The results of these t-tests showed no significant difference between the groups (Table 12) so the null hypothesis was retained.

Table 12

Independent t-Tests of Group Differences for Preoperative State Anxiety, Trait Anxiety, and Postoperative State Anxiety Scores Between Music and Non-Music Groups

Scores	Mean	SD	t	p*
Preoperative State Anxiety				
Music (n = 12)	40.42	14.46	-.13	.447
Non-Music (n = 11)	39.73	9.51		
Preoperative Trait Anxiety				
Music	31.42	7.46	.47	.321
Non-Music	32.82	6.75		
Postoperative State (H_{1}) Anxiety				
Music	32.25	13.23	-.11	.456
Non-Music	31.73	8.87		

*p value one-tailed

To test the hypothesis (H2) of whether arthroscopic knee surgery patients who receive sedative music during the perioperative period will have a greater decrease in systolic blood pressure than patients who do not receive sedative music, paired t-tests were conducted on pre- and post-experimental measures. The mean systolic blood pressure for the experimental group decreased slightly (0.917 mmHg), but was not a significant change (Table 13). The mean systolic blood pressure for the control group also decreased (3.36 mmHg) and that decrease did not show a significant difference (Table 13) so the null hypothesis was retained.

To test the hypothesis (H3) of whether arthroscopic knee surgery patients who receive sedative music during the perioperative period will have a greater decrease in postoperative diastolic blood pressure than patients who do not receive sedative music, paired t-tests on pre- and post-treatment measures were examined. The mean diastolic blood pressure for the experimental group showed a slight increase (0.34 mmHg) which was not significant (Table 13). The mean diastolic blood pressure for the control group showed a decrease (4.09 mmHg) which also was not significant (Table 13) so the null hypothesis was retained.

To test the hypothesis (H4) of whether arthroscopic knee surgery patients who receive sedative music during the perioperative period will have a greater decrease in

Table 13

Pre- and Post-treatment Paired t-Tests of Group Differences for the Variables of Blood Pressure, Heart Rate, and Respiratory Rate Between Music and Non-Music Groups

Music group n = 12			Non-Music group n = 11		
Variable		Mean	SD	t	p*
Systolic Blood Pressure (H2)					
Music	Pre	125.08	19.36	.23	.412
	Post	124.16	14.12		
Non-Music	Pre	119.00	11.60	-.69	.251
	Post	112.36	18.37		
Diastolic Blood Pressure (H3)					
Music	Pre	80.41	7.28	-.14	.895
	Post	80.75	11.46		
Non-Music	Pre	76.63	5.90	1.12	.143
	Post	72.54	12.24		
Heart Rate (H4)					
Music	Pre	75.33	12.85	.57	.288
	Post	73.08	21.05		
Non-Music	Pre	67.00	5.53	.58	.289
	Post	65.18	11.89		
Respiratory Rate (H5)					
Music	Pre	19.33	3.22	1.89**	.042**
	Post	17.66	1.67		
Non-Music	Pre	19.45	1.57	2.80**	.009**
	Post	17.45	1.57		

*p value one-tailed

** significant difference at .05 level

postoperative heart rate than patients who do not receive sedative music, paired t-tests were conducted on pre- and post-treatment measures. The mean heart rate for the experimental group showed a decrease (2.25) which was not significant (Table 13). The mean heart rate for the control group also indicated a decrease (1.82) which did not show significance (Table 13) so the null hypothesis was retained.

To test the hypothesis (H5) of whether arthroscopic knee surgery patients who receive sedative music during the perioperative period will have a greater decrease in respiratory rate than patients who do not receive sedative music, paired t-tests were performed on pre- and post-treatment measures. The mean respiratory rate for the experimental group showed a significant decrease (1.67) ($t = 1.89$, $p = .042$) (Table 13). The mean respiratory rate for the control group indicated a greater decrease (2.00) ($t = 2.80$, $p = .009$) (Table 13) so the null hypothesis was retained.

Independent t-tests were conducted to test the null hypotheses of no significant differences between the experimental and the control groups on the post-treatment physiological measurements of blood pressure, heart rate, and respiratory rate (Table 14). The measurement of post-treatment diastolic blood pressure did approach significance ($t = -1.66$, $p = .056$) (Table 14).

Table 14

Post-Treatment Independent t-tests of Group Differences for the Variables of Blood Pressure, Heart Rate, and Respiratory Rate Between Music and Non-Music Groups

Music group $n = 12$
Non-Music group $n = 11$

Variable	Mean	SD	t	p*
Systolic Blood Pressure				
Music	124.16	14.12	-0.27	.396
Non-Music	122.36	18.37		
Diastolic Blood Pressure				
Music	80.75	11.46	-1.66	.056
Non-Music	72.54	12.24		
Heart Rate				
Music	73.08	21.05	-1.09	.143
Non-Music	65.18	11.89		
Respiratory Rate				
Music	17.66	1.67	-0.31	.378
Non-Music	17.45	1.57		

*p value one-tailed

In summary, the assumption of homogeneity of variance was met as evidenced by the F-values not reaching levels of critical significance on the independent t-tests for pre-treatment blood pressure, respiratory rate, and STAI scores. Even though a significant difference was noted in the pre-treatment (morning of surgery) heart rate measurement ($t = -2.05$, $p = .029$), a difference was not evidenced in the heart rate measurement the day prior to surgery ($t = .10$, $p = .46$). There was no significant difference between the groups on the post-treatment physiological measurements, as predicted. The paired t - values did not reach the $\leq .05$ level for either group on the physiological measurements of blood pressure and heart rate. The paired t-values for respiratory rates did reach the level of significance for both groups, however the greater decrease occurred in the control group. The interpretation of the aforementioned data resulted in the retention of all the null hypotheses.

Qualitative results

The subjects in the experimental group were asked to respond to a question regarding whether the music helped them to feel more relaxed (Appendix H). All of the subjects in this group ($n = 12$) answered affirmatively. The subjects in the control group were asked to respond to a question regarding whether they thought that music would have helped them to feel more relaxed (Appendix H). Affirmative

responses were given by seven (n = 11) subjects in this group, with four negative responses.

Chapter 5

Discussion

The data generated in this study do not support the position that sedative music is effective in decreasing physiological measurements of anxiety or State Anxiety scores in patients experiencing arthroscopic knee surgery. Many possibilities for lack of support for the hypotheses exist. These factors will be further explored.

Power

Power analysis was considered to assess potential for Type II error. The values for power were low, ranging from .051 to .354, on the physiological variables as well as on State anxiety. Effect size has a direct relationship to power. The effect size calculated on the variable of systolic blood pressure was .39 indicating a 77 percent chance of making a Type II error. The level of significance or alpha level also impacts power. The alpha level for this study was set at .05. The small sample size indicates low power.

Physiological data

The findings that blood pressure did not show a significant decrease supported the results reported by Kaempf and Amodei (1989) and Geden, Lower, Beattie, and Beck (1989). The results of significantly lower blood pressure reported by Updike and Charles (1987), Steelman (1990), Updike (1990), Zimmerman, Pierson, and Marker (1988), and Cotanch and Strum (1987) were not supported by this study.

The findings that heart rate did not show a significant decrease supported the results reported by Kaempf and Amodei (1989), Davis-Rollans and Cunningham (1987), and Geden, et al., (1989). This study was similar to Kaempf and Amodei (1989) as the subjects listened to the music while in the holding area of the operating room. The sample size was also similar (n = 15) for the experimental groups. The similarity with Davis-Rollans and Cunningham (1987) was that the subjects listened to music via headphones. The results reported by Updike and Charles (1987), Zimmerman, et al., (1988), Cotanch and Strum (1987) and Guzetta (1989) regarding significantly lower heart rates were not supported by this study.

The significant decrease in respiratory rate supported the results reported by Kaempf and Amodei (1989). However, the control group in this researcher's study also had a significant decrease in respiratory rate.

Patients being treated with anti-hypertensive or cardiac medications were excluded from participation in this study due to the effects these medications have on the physiological measurements being observed. Other studies (Kaempf and Amodei, 1989; Steelman, 1990; Updike, 1990; Updike and Charles, 1987; Cotanch and Strum, 1987; and Geden, et al., 1989) measured physiological parameters but did not address the use of anti-hypertensive or cardiac drugs. Davis-Rollans and Cunningham (1987), Zimmerman, et al., (1988), and Guzetta (1989) included subjects taking these types of medications and noted the types and frequencies of the medications used. Upon further review, as the subjects in this study served as their own control for physiological measurements, this category of patients should not have been excluded from participation. Anti-hypertensive and cardiac medications maintain the patients' blood pressure and heart rate within normal limits. Increases in these physiological measurements can still be seen in response to anxiety. The exclusion of these patients greatly contributed to the small sample size in this study.

State Trait Anxiety Inventory data

The results of this study did not show any significant decrease in post-treatment State anxiety scores. These findings supported the results reported in Moss (1987), Kaempf and Amodei (1989), Steelman (1990), and Zimmerman, et

al., (1988). Many similarities exist between this study and the study reported by Moss (1987). The sample size was similar (N = 17). The subjects were arthroscopic knee surgery patients. The music was administered throughout the perioperative period via headphones and a tape player equipped with auto reverse. The similarities to Kaempf and Amodei (1989) have previously been discussed. The similar aspects of Steelman (1990) were that the music was administered intraoperatively via headphones. This study was similar to Zimmerman, et al., (1988) only in the variables being measured.

The results reported by Moss (1988), Binnings (1987), Lueders Bolwerk (1990), and Frank (1985) which indicated significant difference on post-treatment State anxiety scores were not supported by this study.

The validity and reliability of Speilberger's State Trait Anxiety Inventory has been previously discussed. A larger sample may have yielded statistically significant results on post State scores. Another possible reason for lack of statistical significance, often seen when using a paper and pencil measurement tool, was that subjects responded in the manner that they believed the researcher wanted them to respond. The "Hawthorne" effect may also have contributed to the study results.

Qualitative data

The entire experimental group (n = 12) answered affirmatively to the question: "Do you feel that music helped you to feel more relaxed?". These types of positive comments by subjects were also noted by Bonny and McCarron (1984), Updike and Charles (1987), Stevens (1990), Updike (1990), Geden, et al., (1989) and Guzetta (1989).

The majority (63.6 percent) of the control group answered affirmatively to the question: "Do you feel that music may have helped you to feel more relaxed?".

In deference to the lack of statistical significance that this study offered for the use of music, the patients' perceptions were that the music made them feel more relaxed. Several patients, who had been subjects in the experimental group, had further comments regarding the music, which they shared during postoperative office visits. These comments included: "I really liked having the music."; " The music made me feel more relaxed about having surgery."; "The music was really helpful."; "You should use music for everyone."; "A nice distraction from hospital noises."; and "I felt very relaxed and content.".

The subjects in the music group were usually able to select a tape which coincided with their preferred music listening habits. Three subjects selected the classical tape. The easy listening tape and the country-western tape were each selected twice. The oceans sounds tape was chosen

by the remaining six subjects. All of the music group subjects stated that they were pleased with their selections.

Observations of the behavior of the subjects, made by the researcher, indicated that the experimental group was more relaxed. In the holding area, the subjects in the music group were resting quietly with their eyes closed. Once in the operative suite, the music group maintained their relaxed demeanor, even during insertion of the intravenous catheter. In contrast, the subjects in the control group had their eyes open, were glancing about, and at times exhibiting facial grimacing, until the induction of anesthesia.

The subjects in the experimental group stated that they felt more relaxed and by observation appeared more relaxed. Therefore, the use of music can be viewed as a beneficial nursing intervention, from the qualitative standpoint.

The researcher was a constant for all subjects. The same amount of time was spent with each subject throughout the preoperative, perioperative, and postoperative periods. This time allowed for development of rapport, trust, familiarity, and continuity of care. This development of the nurse/patient relationship may have resulted in decreased anxiety responses by the subjects.

Conclusions

The small sample size was a significant factor in data analysis. A number of potential subjects were excluded from participation because they were taking anti-hypertensive medications. A larger sample was expected at the onset of data collection.

The Neuman Systems Model provided a conceptual framework for this study. The variables observed were physiological and psychological. Music was viewed as a primary prevention. Arthroscopic knee surgery was considered the stressor. The conclusions based on the model are first, that music was not an adequate primary prevention. The evidence for this conclusion was the lack of statistical significance on the pre- and post-treatment physiological measures and State anxiety scores. The second possible conclusion was arthroscopic knee surgery was not considered to be a major stressor by the subjects. The rationale for this conclusion was, the majority of the subjects pre-treatment physiological measures fell within the normal range for blood pressure, heart rate, and respiratory rate. The pre-treatment State Anxiety scores revealed that the majority of the subjects scored in the low range (n = 13). Eight subjects scored in the moderate range and two in the high range of State Anxiety.

Qualitative data results, positive comments made by subjects, and observations by the researcher all contribute

to the conclusion that music can be viewed as a beneficial nursing intervention.

Recommendations

There is evidence, based on the qualitative results of this study, that music can be viewed as a beneficial nursing intervention. Replication of the study should be considered with several changes. A larger sample size would increase the power of the statistics. Inclusion of subjects on anti-hypertensive and cardiac medications would increase the sample size.

The addition of an observed behaviors form would strengthen the qualitative data. This would include such categories as, skeletal muscle tension, eyes open or closed, and facial expressions.

Allowing the patients to listen to their own music selections, rather than tapes selected by the researcher, could be explored. The use of tapes with positive types of subliminal messages might be evaluated.

The use of music as a nursing intervention should continue to be evaluated in the perioperative area as well as in other clinical settings.

PLEASE NOTE

Copyrighted materials in this document have not been filmed at the request of the author. They are available for consultation, however, in the author's university library.

Appendix A, Arthroscopy of the Knee Examination and Surgery Booklet
Appendix B, Arthroscopy of the Knee Booklet

University Microfilms International

Appendix C

Routine Arthroscopy Instruction using a Knee Model

This represents your knee. The large bone in the thigh is the femur. The large bone in the lower leg is the tibia, the smaller one the fibula, and this is the patella. These springs represent the ligaments which hold the joint in place. This C-shaped cup, called the cartilage or meniscus, acts as a shock absorber and prevents the bones from rubbing together. What often happens is a piece of cartilage will tear away from its normal position and cause pain, locking, and clicking. You may also have some softening or roughening to the underside of the bone surfaces.

What Doctor will do is, under general anesthesia, he will make anywhere form two to four quarter inch incisions on either side of the knee. Through one of these incisions he will put the scope and look around the entire inside of the knee joint. Through the other incision he will put small instruments, like these, and take care of the problem in your knee, and hopefully make your knee feel better.

The arthroscopy is done as an out-patient procedure. What this means is, that the day prior to your surgery, you will come here to the office to get some paperwork from me, have your blood pressure checked and make sure that you

haven't been ill. From here you will go to University Medical Center, to the admitting office. They will send you for a blood test, urine test, chest x-ray and EKG (if patient is over 40). After you get done at the hospital you go home. Nothing to eat or drink after midnight that night. That includes the morning of surgery, no water, no coffee, nothing. You may brush your teeth but don't swallow.

You will report to the hospital at about 7:00AM, I will tell you the exact time when you come in for your paperwork. Someone will need to drive you and be available to take you home. You will need to wear shorts or loose fitting pants as you will have a large bandage which goes from your ankle to the top of your thigh.

The large bandage can come off after 48 hours. The first two days we want you to lay low. Up for meals and to the bathroom, but otherwise lying down with your leg elevated and an ice pack on your knee. After the big bandage comes off you may shower but no soaking in the tub or Jacuzzi. You will find little tapes on your knee over your incisions. Leave them alone. They will fall off with normal showering after a few days. Any questions?

Take these two booklets with you. One is a generalized information booklet about arthroscopy, the other is specific to our practice. My name and number is in the back of the booklet, if you have any other questions, please call.

Appendix D

Consent Form

I, _____ hereby agree to participate in the research study being conducted by the Registered Nurse Giselle Hampel-Peters as part of her graduate degree at UNLV. I understand that the purpose of the study is to examine selected responses in arthroscopic knee surgery patients. I understand that my identity will be kept confidential. I understand that I may withdraw from the study at any time without any penalty to me. I understand that I will be completing questionnaire forms and that my blood pressure, pulse, and respirations will be taken at various times. I understand that I may ask any questions about the study at any time. I understand that I may request a copy of the results of the study after it is completed. I realize that I will still receive all care normally given to arthroscopic knee surgery patients.

Signed: _____

Witnessed: _____

Date: _____

Appendix E

Consent Form

I, _____ hereby agree to participate in the research study being conducted by Registered Nurse Giselle Hampel-Peters as part of her graduate degree at UNLV. I understand that the purpose of the study is to examine the effects of music on selected responses of arthroscopic knee surgery patients. I understand that my identity will be kept confidential. I realize that I may withdraw from the study at any time without any penalty to me. I understand that I will be completing questionnaire forms and that my blood pressure, pulse, and respirations will be taken at various times. I understand that I may ask questions about the study at any time. I may request a copy of the results after the study is completed, if I desire. I realize that I will still receive all care normally given to arthroscopic knee surgery patients.

Signed: _____

Witnessed: _____

Date: _____

Appendix H

Qualitative Questions

(To be asked of subject by ASU RN)

Post Operative Question: E

Do you feel that the music helped you to feel more relaxed?

Yes_____ No_____

Comments: _____

_____

(To be asked of subject by ASU RN)

Post Operative Question: C

Do you feel that music may have helped you to feel more relaxed? Yes_____ No_____

Comments: _____

_____

Appendix I

Code # _____

Demographic Data Form

Place an "x" in the appropriate blank for each question:

Age: 21 to 29_____ 30 to 39_____ 40 to 49 _____

50 to 59_____ 60 to 65_____

Sex: Male_____ Female_____

Marital Status: Single_____ Married_____ Divorced_____

Separated_____ Widowed_____

Ethnic Origin: Caucasian_____ Hispanic_____ Asian_____

Black_____ American Indian_____

Other (please specify)_____

Education: No formal education_____ Grade School_____

Some High School_____ High School Diploma____

Some College_____ College Degree_____

Graduate School_____ Technical School_____

Other (please specify):_____

Have you ever had surgery before: Yes___ No___

If so, how many: 1____

2 to 5_____

more than 5_____

List types of surgeries:_____

_____

When was your last surgical procedure:

within the last year_____

1 to 2 years ago_____

3 to 5 years ago_____

What types of music do you enjoy listening to:

classical_____ soft rock_____

country/western____ hard rock_____

reggae_____ rap_____

jazz_____ folk_____

heavy metal_____ oldies_____

other_____

How often do you listen to music: daily____

5 to 6 days per week____ 2 to 4 days per week____

once per week____ less than once per week_____

If daily, how many hours: less than one____ 1 to 3____

4 to 5____ 6 to 8____ greater than 8_____

Comments: _____

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