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THE EFFECT OF MUSIC THERAPY ON INTENSIVE CARE PATIENTS

by

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of the requirements for the degree of

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in

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Approval Page

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ABSTRACT

Many studies have shown that the environment in the Intensive Care Unit contains factors which elicit various physiological and emotional responses. This investigation, which was a replication of a previous study, studied both the patient's physiological and emotional responses to taped music programs in Intensive Care Units. The sample population (N = 51) of the study consisted of Intensive Care patients with a variety of diagnoses. The experimental group (n = 26) selected and listened to taped music through earphones, and the control group (n = 25) wore earphones connected to recorders without music. Physiological parameters of heart rate, blood pressure, and mean arterial pressure were recorded before and after a 30 minute experimental period. The patients' emotional responses were recorded before and after the experimental period using the Changes in Emotional State questionnaire as the basis for the patient interview. Demographic data was self-reported by the

patient and obtained from the hospital record. Demographic data was analyzed using descriptive statistical methods and independent t tests. Paired t tests used for testing the difference between physiological parameters taken pre-treatment and those taken post-treatment revealed no significant difference between the experimental group and the control group. There was a positive change in the emotional state of the music group based on verbal responses to the Changes in Emotional State questionnaire except for the nervousness/worry category. This study provided information on the use of music as intervention aimed at reducing the patient's stress reaction, and thereby potentially helping nurses to improve the quality of patient care.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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CHAPTER I

INTRODUCTION

Anywhere one travels in the world, there will be music. It has existed throughout the ages to provide entertainment, enjoyment, relaxation, distraction, and motivation. In addition, music has been used in a variety of settings and methods for therapeutic purposes (Cook, 1981). In ancient times, music was used as a means of warding off evil spirits and to increase fertility in women (Cook, 1986; Harvey, 1988). The Hebrews recorded the use of music to absolve moods of despondency in King Saul (1 Samuel 16:23). By the 1800's, physicians began to believe that music could be used as a therapeutic tool and needed to be scientifically studied (Harvey, 1988). At that time, some studies had already been done on the effect of music on parameters such as pulse rate, respirations, and blood pressure (Cook, 1981).

More recently, Van de Wall (cited in Cook, 1981) documented the use of music in American hospitals after World War II as a means of strengthening the morale of wounded or shell-shocked soldiers. Since then, the

concept of music therapy has grown through clinical and laboratory research studying the physiologic and psychologic effects of music (Cook, 1981). Specific patient populations in a variety of settings including obstetrics (Durham & Collins, 1985), psychiatry (Ziporyn, 1984), preoperative (Kaempf & Amodei, 1989; Updike & Charles, 1987), intraoperative (Steelman, 1990), and postoperative (Locsin, 1981), coronary care (Davis-Rollans & Cunningham, 1987; Bonny, 1983), dentistry (Gardner, Licklider, & Weisz, 1960), and hospice (Jacob, 1986) have used music as a therapeutic tool. Very little, however, was reported from the Intensive Care Units of hospitals on the therapeutic effects of music.

Patients in the Intensive Care Unit (ICU) encounter many environmental stressors in addition to the illness or injury for which they were admitted (Smith, 1986). Disturbances in self-concept, body image, and self-esteem, altered role performance, feelings of powerlessness, and hopelessness may be exhibited by the patient in ICU (Thelan, Davie, & Urden, 1990). These disturbances can be brought on by either sensory deprivation or overload, interruption of

the circadian rhythm, loss of familiar surroundings and family, and facing the reality of death (Smith, 1986). A thorough assessment of the patient by the nurse will expose stressors which potentially could interfere with the patient's recovery. The nurse and patient can then mutually set goals for recovery utilizing interventions which focus on eliminating or managing identified stressors.

Problem statement

Patients in the Intensive Care Unit (ICU) are exposed to many stressors. Stressors delay or interfere with recovery by their influence on the physiological parameters of heart rate (HR), blood pressure (BP), and mean arterial pressure (MAP). The patient's emotional response to the stressors in the ICU may be manifested in depression, anxiety, and increased intensity of pain. Reducing the effect of these stressors can positively influence the patient's recovery. The problem of interest in this study was whether physiological and emotional responses to stressors in the ICU could be diminished utilizing selected taped music.

Purpose of the study

The purpose of this quasi-experimental study was to investigate the effects of specifically chosen taped music programs on the physiological and emotional responses of the critically ill patient in the Intensive Care Unit (ICU). Previous studies (Bolwerk, 1990; Kaempf & Amodei, 1989; Moss, 1988) have utilized selected taped music with various patient populations, but few have combined analysis of the physiological parameters with the emotional state component with patients in the ICU setting. To improve the quality of care for patients in the ICU, more empirical information is needed about how music can impact the physiological and emotional response to stressors in the ICU.

Significance of the study

Caring for the patients in Intensive Care Units requires more than simply dealing with a critical illness. Normal defense mechanisms which allow patients to cope are diminished (Smith, 1986). Many studies have been done which utilize music as a means of decreasing the physiological response to stress

(Bonny, 1983; Kaempf & Amodei, 1989; Peretti & Zweifel, 1983). Music has also been shown to affect a person's emotional state (Bolwerk, 1990; Moss, 1988; Updike & Charles, 1987). Research completed on physiological and emotional responses to music as an intervention with patients in the ICU was not abundant. This study, which was a modified replication of Updike's (1990) "Music Therapy Results for ICU Patients" study, will add to the existing body of knowledge in the care of patients in the ICU. Information gained in this study could be used by nurses in planning interventions to optimize nursing care and to facilitate optimal recovery.

CHAPTER II

REVIEW OF RELATED LITERATURE AND CONCEPTUAL FRAMEWORK

Therapeutic use of music in clinical settings

Studies have shown that music produces certain physiological and emotional responses in specific settings and with particular populations. Locsin (1981) conducted a study to investigate the effects of music on the perception of pain of selected post-operative patients in the first 48 hours. The sample consisted of 24 female gynecologic and/or obstetric patients who were paired by age, type of surgery, educational background, and previous operative experience into control and experimental groups. Pain was measured by the Overt Pain Reaction Rating Scale (OPRRS) developed by the researcher from three previously used scales. Reliability and validity were not reported. Analgesics received, arterial blood pressures, pulse rates, and respiratory rates were also measured. There were significant differences in the musculo-skeletal, verbal, and physiological-autonomic

pain reactions among these patients during the first 48 hours. There were fewer overt pain reactions when music was provided in the first 24 hours. There were significantly fewer increases in blood pressure in the patients who received music in the 48-hour period. Patients who listened to music had fewer increases in pulse rates in the second 24 hours. Finally, the patients who listened to music during the 48 hours received less pain relief medication. A weakness of this study was that the music selections were not identified, so that it was unclear what type of music was utilized. Although the sample size was small, it was concluded that music was a useful intervention in decreasing the perception of pain in postoperative patients.

The effects of sedative music played during the perioperative period was the focus of a study by Moss (1988). The sample of 17 adult patients awaiting arthroscopic surgery was alternately divided into experimental and control groups. Each participant in the experimental group chose tapes of sedative music which were played during surgery. The State-Trait Anxiety Inventory (STAI) was administered

preoperatively and the state portion of the STAI was administered two hours postoperatively to both groups to measure anxiety levels. Although reliability for the STAI was not assessed for this sample, the tool was developed by Spielberger, Gorsuch, and Lushene (cited in Moss, 1988) and had been frequently used in research with a variety of populations. Results of the study showed that there was a significant decrease from preoperative to postoperative anxiety for patients who listened to music. The paired *t* test supported the hypothesis that sedative music decreased anxiety. There were three reported weaknesses of this study: 1) the small sample size; 2) the use of a written test in the immediate postoperative period; and 3) the anxiety rating initially was generally lower than expected for both groups.

Sayk (1985) addressed the question of the effect of music on preoperative anxiety in an unpublished quasi-experimental study. The hypotheses for this study were: 1) preoperative patients who receive music were less anxious prior to surgery than those preoperative patients who did not receive music; 2) the control group who demonstrated anxiety (awake

control) were more anxious than the control group that did not demonstrate anxiety (asleep control); 3) the control group that did not demonstrate anxiety (asleep control) did not differ from the experimental group that did not demonstrate anxiety (awake control); and 4) the experimental group demonstrating anxiety (awake experimental) was less anxious prior to surgery than the control group demonstrating anxiety (awake control) because of the music. The 30 adult patients who were to have elective surgery were divided into control (no music; $\underline{n}$ = 16) and experimental (music; $\underline{n}$ = 14) groups. Using the Anxiety Rating Scale, these groups were further divided into asleep control, awake control, asleep experimental, and awake experimental groups based on the patient's observed activity in the preoperative holding area. The Anxiety Rating Scale was developed by the investigator from the defining characteristics of anxiety identified by Kim (cited in Sayk, 1985). Behaviors included were: restlessness; extraneous movements; facial tension; non-purposeful glancing; hand tremors; expressed nervousness; blood pressure; heart rate; and respirations. Validity of the tool was evaluated by expert nurses. Sayk stated

that, "Reliability was reported as significant (alpha = 0.90) for all items except the blood pressure scale" (Sayk, 1985, p.11). Postoperatively, each patient was observed using the Anxiety Rating Scale and was also interviewed to assess recall of their preoperative experience. The investigator reported that comparing the scores for all subjects, the first and second hypotheses were not supported. Acceptance of the third hypothesis was expected due to the assumption that sleeping patients were not anxious. The Awake Experimental group was not found to be less anxious than the Awake Control group based on the reported score (F = 0.86; df = 1.17; p = .37) so that the fourth hypothesis was rejected. The investigator stated that limitations of this study included the small sample size and the lack of individualized music preference. She concluded that the Anxiety Rating Scale may not be sensitive to indicators of anxiety in this situation. She also stated that the theoretical notion might not be supported by the data collection method. The length of time the Experimental groups listened to the music was not identified. The Betty Neuman Health Care Systems Model (1982) was cited as the conceptual

framework chosen to guide this study. It was unclear how the framework was incorporated into the project.

Kaempf and Amodei (1989) also used sedative music and the State-Trait Anxiety Inventory (STAI) to evaluate the effects of sedative music on anxiety. The 33 outpatients awaiting arthroscopic surgery were randomly assigned to either an experimental group who listened to music for 20 minutes or a control group who did not listen to music. An independent *t* test comparing the two groups with respect to each variable showed that there was no significant difference between groups on arrival in the holding area. Results for the experimental group showed that there was a statistically significant decrease in respirations and anxiety test scores using the paired *t* test. Systolic blood pressure for this group were marginally significant. The control group had statistically significant paired *t*-test scores for decreases in systolic blood pressure and anxiety tests scores. The sample size (N = 33) and environmental factors were identified as limitations in this study.

Frank (1985) conducted a study to investigate the effects of music therapy and guided visual imagery on

anxiety and perceived nausea and vomiting experienced by patients who had a history of chemotherapy induced nausea and vomiting. Using a single group pre-post test design, a non-randomized convenience sample of 15 hospitalized patients participated. The Spielberger State-Trait Anxiety Inventory (STAI) was used to measure pre- and post-chemotherapy anxiety levels. The researcher developed Nausea and Vomiting Questionnaire I to determine the patient's past length and intensity of nausea and vomiting, and Nausea and Vomiting Questionnaire II to determine the patient's perceived length and intensity of nausea and vomiting during the experimental treatment. The visual imagery tool consisted of five environmental scenes. The music on the tapes was matched to the visual scene. Validity and reliability were not reported for any of the tools utilized. A paired t test revealed a significant difference between pre- and post-intervention scores on the state anxiety scale ($t = 5.68$, $df = 14$, $p \leq .001$). The patient's perceived degree of nausea and perceived length of nausea were not significantly different after the intervention as measured by the paired t test. The length of vomiting variable was measured using the t

test which did not reach the critical level. The authors suggested that there was a natural decrease in anxiety during the 20 minute waiting period. The researchers also postulated that the response to the anxiety test may not have reflected the patient's true feelings. There was no patient choice in the type of music played. Reported results showed that significant findings and positive trends existed between music therapy and guided imagery, state anxiety, and the length and degree of nausea and vomiting related to chemotherapy administration. The author cautioned in falsely attributing the decrease in anxiety alone to the visual imagery and music. Stated limitations in this study included lack of a control group, and administering the second STAI two hours after the first. It was not clear whether either the music, or the visual imagery, or the combination of the two, brought about the decrease in anxiety.

Mullooly, Levin, and Feldman (1988) examined the role of music in reducing postoperative pain and anxiety in a group of 28 women who were hospitalized for elective abdominal hysterectomies. One group of 14 women received a tape of easy-listening music

(experimental) on the first and second postoperative day, while the other group of 14 women (control) did not. The subjects were randomly assigned to the groups. Pain and anxiety were self-reported on the first and second evenings after surgery by means of a visual analog scale and a five point graphic scale, respectively. Both scales were reported to have been valid indicators of pain (Hukisson, 1974; Levin, 1981; cited in Mullooly et al., 1988) and anxiety (Levin & Mullooly, 1986; cited in Mullooly et al., 1988) in previous studies. Analysis of variance with repeated measures was used to analyze the data. The pain scores on the pre- and post-ratings on Day 1 were not significantly different regardless of the group the patient was in. The researchers pointed out that on the first postoperative evening many of the patients were either too drowsy or nauseated, had not returned from the recovery room, or were under the influence of analgesic medication, to complete the scales, thus explaining the lack of significance in those scores. Patient's ratings of pain and anxiety indicated that the mean scores of the experimental group decreased after listening to taped music, while the mean scores

of the control group showed relatively little change. Mullooly et al. (1988) reported a lack of control of the exact time of administration of pain medication as being a limitation of the study. They stipulated a minimum of three hours post-medication, but there may have been a difference due to the influence of pain medication when the intervention was used. They also identified the Hawthorne effect as a possible biasing factor.

Music provides auditory distraction which may be one component of why physiological parameters and anxiety levels are altered when patients hear it. Binnings (1987) studied the effects of an auditory distraction on anxiety on 20 ambulatory surgical patients experiencing regional anesthesia who were randomly assigned to experimental and control groups. The patient's anxiety level was measured by the Spielberger State Anxiety Inventory (STAI) preoperatively and one hour postoperatively. The experimental group was given a choice of "nature" tapes to listen to during their surgical procedures. The tapes consisted of sounds of the ocean, birds, a lagoon, and resonant chimes. Another measurement of

distraction was the amount of sedation required during the surgical procedure. The amounts of anesthetic and analgesic drugs were recorded for each group. The *t* statistic, used to evaluate the data, revealed a statistically significant decrease in state anxiety for the experimental group with a $p = .025$ in the mean anxiety scores. Also the amounts of analgesic and anesthetic drugs received by the experimental group were less than the control group. The type of surgical procedure performed and the amount of listening time were not specified. These factors may affect the pre and postoperative anxiety responses. Binnings concluded that the use of an auditory distraction was useful in decreasing state anxiety in patients experiencing regional anesthesia.

Steelman (1990) selected adult patients undergoing outpatient surgery with local or regional anesthesia for her study of Intraoperative Music Therapy. More specifically, the patients were all having hand or wrist surgery. The convenience sample of 43 patients was randomly divided into control and experimental groups. The purpose of the study was to evaluate the effects of intraoperative tranquil music on patients'

anxiety and blood pressure. The A-State scale of the State-Trait Anxiety Inventory (STAI) was used to measure state anxiety preoperatively and within 30 minutes postoperatively. The tool was selected because of its wide use and acceptance. The patient's blood pressure was also measured as a physiological response indicator. Each patient in the experimental group was allowed to select a tape from a group of what was reported as tranquil music. An equal amount of time was spent with the patients in the control group discussing events unrelated to the study or surgery. The amount of intervention time was not specified. No significant results were reported between the groups on the demographic variables. The mean preoperative anxiety scores were confirmed by *t* test not to be significantly different. There was a significant decrease in anxiety scores in both groups. The difference in preoperative mean systolic pressures for both groups was not significant. There was a lower preoperative mean diastolic pressure for the control group representing a significant difference between groups. The paired *t* test was used to compare the mean change in systolic pressure and diastolic pressure.

The control group had no significant change, while the experimental group had a decrease of 6.48 mmHg which was significant. The control group showed an increase in postoperative mean diastolic pressure while the experimental group had a decrease of 5.24 mmHg. Steelman stated that reducing anxiety with music appeared to be comparable to using verbal distraction as a means of decreasing anxiety. She further concluded that music had a stronger physiological effect than did verbal distraction. The control group in this study was nullified when verbal distraction was used as an intervention to decrease anxiety. There was no control of the discussion between the nurses, physicians and the patients. Steelman stated that there was no control of pathology and medication affecting blood pressure.

The physiologic responses of coronary care patients to selected classical music was the focus of a study by Davis-Rollans and Cunningham (1987). Physiological parameters which were assessed included heart rate, heart rhythm, and respirations. In addition, psychologic data was collected via a short multiple-choice questionnaire which had been reviewed

by university music department members for validity. A sample of 24 coronary care unit (CCU) patients was continuously monitored (heart rate, rhythm, and respirations) for two 42-minute periods in the same day. Twelve of the patients had a diagnosis of myocardial infarction and the remaining twelve had other cardiac conditions. The sequence of experimental or control periods was randomly determined. The order of the musical selections was also randomly selected. After the music period, the psychological survey was taken. There were no clinically significant changes in the heart rate, although some changes were determined to be statistically significant. Similarly, there were no significant effects on the respiratory rate of the subjects who listened to the music. Also, there were no clinically dangerous arrhythmias during the listening periods. Eight of the subjects reported a happier emotional state and others reported a change from "sad, depressed, or worried" to less depressed. The authors reported a lack of reliability of the questionnaire, thus the tool required further research.

Another study involving patients in the Coronary Care Unit (CCU) was conducted by Zimmerman, Pierson, and Marker (1988). The problem of interest was the effects of listening to relaxation-type music on self-reported anxiety and on selected physiologic indices of relaxation in patients with suspected myocardial infarction (MI). Seventy-five patients were randomly divided into two experimental groups (one listened to music and one listened to "white noise") and one control group. The State-Trait Anxiety Inventory (STAI) was administered before and after each testing session to measure transitory and predisposition to anxiety. Test reliability correlations for the trait scale ranged from 0.73 to 0.86 compared with 0.16 to 0.54 for the state scale. The alpha coefficient values obtained for internal consistency ranged from 0.83 to 0.92 for the state scale and from 0.86 to 0.92 for the trait scale. Construct validity was tested with 977 undergraduate students. Physiological parameters monitored were blood pressure (BP), heart rate (HR), and digital skin temperature. There was no significant difference among the three groups for state anxiety scores or physiologic parameters. Because of this

finding, analyses were conducted of the groups combined. There was a significant difference, over time, for all subjects as a total group in the physiological parameters. These findings for the music group were not consistent with the findings of the relaxation response reported by Benson (1977). The researchers noted that CCU patients often use denial as a coping mechanism which may have contributed to their initial low anxiety level. They also suggested that the 30 minute "rest" period for all groups may have contributed to the trend toward reduced anxiety and improved physiologic parameters.

The effectiveness of relaxing music on state anxiety in myocardial infarction (MI) patients was the focus of a study by Bolwerk (1990). A pre- and post-test design was used with 40 adult patients randomly divided into music and non-music groups in five midwestern community hospitals. All of the patients had a medical diagnosis of having had an MI. The music group received three sessions of music over three consecutive days. Anxiety was measured by the State-Trait Anxiety Inventory (STAI) developed by Spielberger, Gorsuch, and Lushene (cited in Bolwerk,

1990). Reliability coefficients ranged from .83 to .92. Construct validity was also reported. The *t*-test score revealed that the music and non-music groups were statistically similar prior to the music intervention. The post-treatment state anxiety score between groups was statistically significant at the $p = .007$ level. The pre-treatment mean score to the post-treatment mean score within each group was also statistically significant. The overall data supported the hypotheses with one exception. The third hypothesis stated that there would be no decrease in state anxiety scores of MI patients who did not listen to music. The researcher stated that there were many factors other than music that could lessen anxiety including denial, medications, and physiological improvement of the heart. She stated that about half of the patients in each group were transferred from the ICU during the study. This factor would contribute to or at least elicit some response which could affect the outcome of the study. In addition, the researcher strongly suggested that the use of denial by MI patients in the first 48 hours after admission was common. She

indicated that a better understanding of the relationship between denial and anxiety was needed before conclusions could be made.

Another sample of 80 patients with the presumptive diagnosis of acute myocardial infarction was randomly divided into three groups to study whether relaxation and music therapy were effective in reducing stress. This pre- and post-test design experimental study by Guzzetta (1989) was conducted in the Coronary Care Units (CCU) of three hospitals. The physiological parameters of heart rate and peripheral temperature, cardiac complications, and qualitative patient data were collected over a two-day period. The relaxation group was instructed in relaxation technique which they practiced for 20 minutes twice a day for three sessions. The music group listened to a 20-minute tape of soothing music of their choice following the same schedule as the control group. The control group received routine nursing care during the same time period. The action of drugs which might affect heart action were recorded and accounted for and were found to be equally distributed among the three groups. ANOVA was used to determine whether there was a

significant decrease in heart rate for the experimental group when music or relaxation therapy was used compared to the control group. Over time, both music and relaxation were more effective than no intervention at lowering heart rate, especially during the third session. Music was found to be more effective than relaxation therapy in increasing peripheral temperature, and both interventions were more effective than no intervention. There was no significant influence, over time, for either intervention. Incidence of cardiac complications among the three groups revealed that the control group had a significantly higher complication rate than did the other two groups. Finally, the therapy groups were asked qualitative questions about the therapy sessions. The majority (92%) stated that the interventions were "extremely helpful to helpful". When asked if the sessions would be helpful for future CCU patients, 94% stated that they would be "extremely helpful to helpful". Continued use of the techniques after transfer and after discharge was indicated in 77% and 81% respectively. This study demonstrated that physiological responses to anxiety can be decreased in

a variety of ways. Guzzetta suggested that music may have an advantage of blocking out environmental noise. She stated that the qualitative input from the patients was helpful in presenting a holistic evaluation of these interventions. "These qualitative data demonstrate the impact of such therapy on the patient's perception of the CCU's experience . . ." (Guzzetta, 1989, p. 615).

Updike and Charles (1987) completed a study in which they investigated the physiological and emotional responses of patients awaiting an elective plastic surgery procedure to 30 minutes of taped music. This was a modified replication of Bonny's (1983) pilot study which reported a highly significant decrease in heart rate, downward trend in blood pressure, and changes in emotional condition from negative to more positive mood states following the music listening experience. Updike & Charles' study included physiological parameters of heart rate (HR), mean arterial pressure (MAP), and double product index (DPI). The emotional response was measured by verbal patient responses regarding alterations in anxiety, depression, and preoccupation with anticipated pain.

The categories for the verbal response were obtained from a tool used by Bonny (1983), the Emotion Condition Rating Scale (ECRS). Validity and reliability had not been established for the tool. Updike and Charles developed an open-ended, nondirective questionnaire (Changes in Emotional State) from the themes of the ECRS. Verbal and body language were also recorded. Physiological parameters and the emotional response questionnaire were completed before and after listening to music. The patient was able to select one of five classical or contemporary taped programs and listen for 30 minutes. Updike and Charles (1987) reported that every physiological variable decreased in value at the $p < .001$ level of significance. In addition, "the most significant emotional effect appeared to be an experienced shift in patients' awareness toward a more relaxed, calm state" (Updike & Charles, 1987, p. 29). Limitations of this study included the small sample size ($N = 10$) and the lack of a control group. The authors cited the influence of the presence of the researcher on the patient's responses, and the test-retest time factor as potential factors limiting the study. They did conclude that music was beneficial in

exhibiting a positive change in emotional state. The qualitative nature of the questionnaire allowed for a more detailed investigation of emotional state measurement.

Updike (1990) utilized the same format as the previous study to conduct a study with patients in the Intensive Care Unit (ICU). The convenience sample consisted of 20 adult ICU patients with a variety of diagnoses. Physiological parameters of heart rate (HR), blood pressure (BP), mean arterial pressure (MAP), and double product index (DPI), and an electrocardiogram (EKG) rhythm strip were measured before and after music treatment. Emotional responses were assessed by the investigator using a nondirective, open-ended questionnaire before and after music treatment. The questionnaire was developed from the five themes of the Emotional Condition Rating Scale (ECRS) which included: emotional mood state, aloneness, anxiety/worry, perception of care and experience of pain. Each participant selected one of eight music programs of classical or contemporary music which was played via an audiocassette with a headset for 30 minutes. Updike reported that the paired *t*-

test analysis revealed a significant reduction in systolic blood pressure, MAP, and DPI from pre- to post-test measures for the 20 subjects. Although EKG was not a parameter specified in the hypotheses, Updike reported that there were no significant rhythm pattern changes. The emotional status assessment showed that patients' moods changed toward a more desirable state of well-being. These findings support the work of Bonny (1983), Benson (1975), and Jacobsen (1976). Although there was no validity and reliability reported for the questionnaire, the results of this study add support to its use in previous work. Weaknesses of the study reported by Updike (1990) were the presence and interaction of the researcher with the participants, absence of long-term effects, and lack of a control group.

The Intensive Care Unit experience

For patients admitted to the ICU, the environment designed to stabilize and sustain their lives also possesses additional stressors. This technicologically advanced area may create a totally alien and

life-threatening environment for them according to Smith (1986). She identified lack of normal sensory input combined with bombardment of strange sensory input as causes of psychological stress for ICU patients. In addition, there is a disturbance in the normal periodicity or physiological clock which can cause irritability and anxiety, physical exhaustion and fatigue, and disruption of metabolic function (Smith, 1986). The advent of critical care units in the 1960's and 1970's has generated much research into the nature of this environment. More recently, studies have investigated the impact of the identified stressors of the critical care environment on the patient. The nurse must have knowledge of potential stressors, and then be able to identify how the patient is reacting to the stressor. Interventions, such as music, may then be employed to minimize or alleviate the patient's response.

The human body's response to stress can be as simple or complex as the stressors which cause the response. Hans Selye was a pioneer in studying the effects of stress on the human body. Selye (cited in

Bullock & Rosendahl, 1984) defined stressors as tension-producing stimuli that potentially could cause disequilibrium. He described a general adaptation syndrome which could be elicited from physiological, psychological, sociocultural or environmental stressors. The three stages of the syndrome are: (1) alarm reaction, (2) stage of resistance, and (3) stage of exhaustion. When a stimulus is perceived as a stressor, the hypothalamus causes stimulation of the sympathetic nervous system which, in turn, releases norepinephrine and epinephrine. Guyton (1986) stated that physical stressors usually excite the sympathetic nervous system, but it could also be activated by emotional states. The physiologic reaction to these hormones affects many body systems (Guyton, 1986). The cardiovascular system is affected by increasing the rate and strength of contraction of the heart along with vasoconstriction, thus increasing peripheral vascular resistance causing increased blood pressure. This overall increased workload causes increased oxygen consumption of the heart (Guyton, 1986). The shift in circulating blood volume is to increase the body's capability to perform vigorous muscle activity quickly.

The stage of resistance incorporates the endocrine system. In stressful situations, the hypothalamus stimulates the pituitary which causes increased release of adrenocorticotrophic hormone (ACTH), antidiuretic hormone (ADH), and thyroid stimulating hormone (TSH) (Bullock & Rosendahl, 1984). ACTH targets the adrenal gland to increase the synthesis of glucocorticoids which help to increase the blood glucose levels providing fuel for muscle activity (Guyton, 1986; Bullock & Rosendahl, 1984). ADH acts on the renal tubules to conserve water loss. Thus, there is an increase in blood volume. TSH works on the thyroid to increase the basal metabolism rate and produce thyroxine which makes the body more responsive to the effects of epinephrine (Bullock & Rosendahl, 1984). The last stage, exhaustion, may occur when complete depletion of resistance to the stressor has taken place. Loss of the immunologic defense ultimately leads to death. Bullock and Rosendahl (1984) reported that stress appears to lower the body's defense at least partially due to an increased production of corticosteroids which inhibit immune system activity.

Wilson (1987) studied surgical intensive care patients to identify stressors related to their experience. Utilizing the Neuman Health Care Systems Model (1980), Wilson wanted to determine the incidence of impaired psychologic response (IPR) and the relationship between psychologic response to the Surgical Intensive Care Unit (SICU) and self-identification of stressors. A sample of 38 patients participated in the study. They were all more than 14 years of age and had been in the SICU for more than 24 hours. An assessment of the patient's psychologic status was determined using a mental status examination developed by Adams, Henson, and Narkool (cited in Wilson, 1987). The mental status examination measured components of delirium, orientation, cognitive function, and memory, hallucinations, illusions, and delusions, euphoric response and catastrophic reaction. The validity and reliability for the tool was reported to have been established by the developers, and was not reported. Assessments using the tool were made each evening during the patient's stay in SICU. Forty-eight hours after the patient was transferred from the SICU and each successive evening after that, the assessment

was made until the patient had a normal psychologic response (NPR). Then the patient was interviewed using the patient stressor scale. This scale was developed from three literature sources which studied stressors. It was tested for validity and reliability with a pilot study and a panel of nurse experts. Results of this study showed that 58% of the patients experienced an IPR during their stay in the SICU. Those in the IPR group identified the following as being most stressful: (1) too much noise; (2) losing track of time; (3) having doctors and nurses talk about the patient rather than to the patient; and (4) being examined by several doctors and nurses. The mean stress index scores of the entire sample that ranked highest were: (1) having pain, (2) not being able to move freely, and (3) frequent interruption of sleep. Wilson was able to identify stressors of SICU patients and utilize the Neuman systems theory to incorporate secondary interventions into patient care.

Simpson, Armstrong, and Mitchell (1989) listed stressors such as difficulty with rest and sleep, pain, noise, isolation, and helplessness as being identified by Intensive Care Unit (ICU) and Coronary Care Unit

(CCU) patients. These negative recollections concur with those documented by Smith (1986). Seeking knowledge of possible positive outcomes of ICU experiences, Simpson, Armstrong, and Mitchell conducted a study in which data was collected from interviews with 59 adult critical care patients. Within 24 to 48 hours of discharge from an ICU or CCU, each participant was asked four open-ended questions about their critical care experience. Two independent investigators read all of the answers and coded them into categories mutually agreed upon. Statistical comparison of the categories was then done using the *t* test and multivariate analysis of variance (MANOVA). The first question asked was why was the patient admitted. Both the ICU (22 of 24) and CCU (26 of 35) patients were able to state why they had been admitted. Patients identified several sources of information regarding their health condition while in critical care. Forty-seven percent of the patients identified the physician alone, or in addition to a family member, as their source of information. The nurse, either alone or with others, was mentioned approximately one-fourth as frequently as the physician. The nurse and

physician were cited together by 24% of the patients. The third question dealt with what care the patient recalled receiving. These actions were divided into four categories: (1) self-care promotion, (2) alleviation of concerns, (3) technical care, and (4) observations. No significant differences were found in the average number or type of actions recalled for the four categories. Patients recalled an average of significantly more neutral or positive actions than negative ones. Overall, actions that were related to observations were recalled most frequently. Types of actions related to technical care and alleviation of concerns were recalled about equally with each other, but less frequently than those of observation. Actions related to self-care were recalled least frequently. Actions most frequently remembered were medications, attentive personnel, and tests. Actions least frequently recalled included sleep promotion, nursing care, interview, hygiene, and surgery. In all four dimensions, patients most often remembered nurses (with or without others) performing actions. Nurses were most associated with activities planned to alleviate patients' concerns. Nurses and doctors were about

equally recalled with observation activities. Lastly, the patients were asked about the impact that the critical care experience had on them. Although the majority of actions were recalled as neutral or positive, the overall impact of the critical care experience was perceived as negative by 56% of the patients. Stated limitations of the study included: (1) the hospital setting was specifically chosen for its excellence of critical care nursing, (2) the possibility that patients' answers were biased to "please" the nurses conducting the study, (3) patients' perceptions during the early transfer may have been limited, (4) the sample interviewed was much smaller than the sample approached for inclusion into the study. There were 92 patients initially approached for the study, but due to transfer, refusal, confusion or inability to remember, only 59 patients were able to complete the interviews. The high number of patients approached and then excluded would indicate that perhaps some of the reasons for exclusion would influence the outcome of the data. In addition, the investigators did not state where the content for the interview came from, nor any reliability or validity.

Although not conclusive, this study added credence to the importance of patients' perceptions of the critical care experience. The actions were perceived as positive, yet they did not overshadow the negative impact of the experience as a whole.

Diekstra, Stubbe, and Willemsteyn (1986) studied the effects of illuminated panels which imitated the view from a window on patients in an Intensive Care Unit (ICU) which had no windows. The panels were illuminated with different scenes and were turned on and off to approximate day/night rhythms. The sample of 43 patients in the experimental group and 37 patients in the control group were all adults. Data was collected from assessments of the nursing staff and verbatim patient responses. During months 1,3, and 5, a scene was shown on the panels from morning through early evening to the experimental group. The nursing staff made assessments of the patients every eight hours using a three-point scale in a checklist manner. The assessment items related to orientation, personality, motor unrest, confusion, and state of stupor. No reliability or validity was reported for the assessment tool. Doses of analgesia and sedation

for the same period were recorded. At discharge, an interview with the patient was conducted which covered four items of orientation and identity. The experimental group also answered a questionnaire about the panels. No specific information was presented about the interview questions or the questionnaire. During months 2,4, and 6, the panels were covered with curtains. The groups contained no significant differences with regard to sex, age, or length of stay in the ICU. The authors reported that considering all of the variables together there was a trend for the experimental group to score more positively. "Disorientation" was the only heading that was significant at the $p = .05$ level. The discharge interview with the experimental group supported the improved spacial orientation of this group. Twenty-four of the 34 patients reacted positively to the panels. Some of the patients stated that the panels provided a pleasant distraction. One patient reported that the scene brought to mind unpleasant memories, and another found the transparencies to be tiresome because details kept recurring in his dreams. Although there were three scenes described, the researchers did not

state how often or when the scenes were changed. The day/night simulation of the panels may have affected the experimental group so that they perceived a more "normal" routine which would affect the circadian rhythm of their body systems. The enhancement of the day/night rhythm for the experimental group was acknowledged by the researchers. The lack of specific information about the tools and interviews leaves room for further refinement of this study, but as reported, the trend toward improved orientation through use of meaningful sensory input was demonstrated.

Another stressor of the ICU reported in the literature was sleep deprivation. Helton, Gordon, and Nunnery (1980) investigated the correlation between sleep deprivation and the intensive care unit syndrome. Their study included 62 adult patients with a variety of diagnoses who had been in the ICU up to five days. On admission, the patients were evaluated using a mental status examination designed to measure known manifestations of the ICU syndrome. The first part of the assessment measured the patient's orientation to time, place, and person. The second part of the assessment documented any abnormal behaviors exhibited

by the subject including hallucinations, paranoia, or delusions. This information was obtained through observation by the nursing staff and interview of the patient. A point value was assigned to each category. The assessment was completed every eight hours and a total score was recorded for the 24-hour period. Interruptions in sleep were documented by the nursing staff any time the patient was disturbed in any way. Sleep deprivation was calculated based on the patient's normal sleeping pattern, the average time required to complete a sleep cycle, and the amount of time the patient was interrupted in a 24-hour period. The cumulative sleep deprivation percentage for each day was compared with the patient's total mental status score for that day. Fifty-six percent of the patients were sleep deprived during the first day in the ICU. The percentage of the sample with sleep deprivation decreased each subsequent day in the ICU. The data obtained on the third day was used to examine the correlation. Results showed that one (2.7%) of the 37 subjects who were not sleep deprived showed mental status changes. One of the 10 subjects (10%) who were moderately sleep deprived showed mental status changes.

In the severely sleep deprived group, 33% (five of 15) demonstrated mental status changes. The total of the two sleep-deprived groups were compared with those who were not at all sleep deprived by use of a Fisher's exact correlation that was significant at $p < .005$ level. This showed that those who were sleep deprived were significantly more likely to exhibit altered mental status then those who were not sleep deprived. Mental status alterations due to physiologic variables were ruled out because they were not consistently related. This study reported lower percentages of mental status alterations and sleep deprivation than other studies. The researchers suggested several possible reasons for this: (1) patients with conditions that might predispose them to development of the ICU syndrome were excluded; (2) lack of sensitivity of the mental status examination tool; (3) the sleep deprivation percentages represent the minimum amount of sleep deprivation experienced by the subject; and (4) nurses may have been sensitized to the number and type of interruptions, thus limiting interruptions and grouping procedures. The researchers also reported that there was a difference in the

environment for the medical and surgical ICU patients. Patients in the medical ICU tended to be in private rooms, doors were closed more often, and the lights were lowered. The surgical ICU patients reported more difficulty sleeping. Of the 31 surgical patients, 15 (49%) were found to be sleep deprived, whereas only 10 (32%) of the 31 medical patients were sleep deprived. The researchers did not report any testing of the mental status assessment tool or the interruption worksheet. This study did indicate that ICU patients experienced sleep deprivation and that there was a correlation between sleep deprivation and mental status alteration.

The severity of illness of the patients in critical care units demands that emergency and technical procedures be performed in the unit. Critical care patients are often in close proximity so that they can often see and hear what is happening to the person in the adjacent bed. Vanson, Katz, and Krekeler (1980) investigated the stress effects on patients in critical care units from procedures performed on others. Their investigation was an extension of Sczekalla's (cited in Vanson et al., 1980)

study in 1973 which noted increases in heart rate of patients witnessing resuscitation procedures. Vanson et al. (1980) measured the heart rates of patients in Coronary Care Units (CCU) who witnessed one of three potentially stressful procedures on other patients in the same unit. One unit was a five-bed open unit, the other was an eight-bed unit with glass partitions separating the beds. The 36 subjects selected for the study were all adults who had been diagnosed with acute myocardial infarction (MI) or suspected MI. For each patient who had witnessed one of the three procedures, five heart rate recordings were taken: baseline (prior to the procedure), at the onset of the procedure, five minutes after the procedure began, at the end of the procedure, and two hours after the procedure was completed. The patients in the open unit demonstrated mean heart rates which were significantly (p = .001 level) higher than those in the partitioned unit. The mean heart rate for the patients in the partitioned unit remained essentially constant while the mean heart rate for those in the open unit showed a sudden increase at the beginning of the procedure and a gradual return to the pre-procedural level. This study

provided strong evidence that unit design does affect patient reaction to stressful events which occur in critical care units. The investigators recognized that only one parameter (heart rate) was used to measure stress, but that this definition was consistent with other literature. The investigators also noted that results of this study supported the auditory cue as a factor in increasing the stress level of the patient.

Patacky, Garvin, and Schwirian (1985) conducted a study which tested the following hypotheses: (1) patients treated with the intra-aortic balloon pump (IABP) would perceive the most psychological stress; (2) patients not treated with the IABP but present on the unit during its use would perceive less stress than those on the pump, but more stress than is perceived by the third group, and (3) patients not treated with and in an environment free of the IABP will perceive the least stress among the three groups. This study was based on Selye's (cited in Patacky et al., 1985) general adaptation syndrome. The patient's perception whether a stimulus is stressful or nonstressful will determine whether the response that can be adaptive or maladaptive. The study was of a survey research design

where structured interviews were conducted with a convenience sample of 27 adult patients in a Coronary Care Unit (CCU) admitted for myocardial infarction (MI) or suspected MI. The beds in the unit were separated by glass partitions and curtains. The sample was divided into three groups. The IABP group (n = 7) had been on the IABP for 48-72 hours. The second group (n = 10) were those who could see and hear the IABP. The third group (n = 10) were in CCU when the IABP was not in the unit. The patients' perception of stress was measured with the Coronary Care Stress Measurement (CCSM), adapted from a tool by Davis, (cited in Patacky et al., 1978). Each patient was presented with a list of 20 potentially stressful situations using a stress rating scale. Reliability was not reported. Validity was ascertained by a group of CCU nurses. The overall mean stress scores indicated that eight of 20 situations were considered stressful. These included: (1) being admitted to the CCU; (2) not knowing or understanding the illness and its seriousness; and (3) being unable to move about freely in bed because of the equipment. The hypotheses were tested by comparing the groups in three ways. The IABP group scored 18 of 20

situations as being stressful while the second group scored only three of 20 situations as stressful. For all three groups, being admitted, and not being able to move freely due to equipment were listed in the top five stressors. There were no significant differences in scores between the second and third groups. Patients on the IABP listed stressors directly associated with the machine as being most stressful (i.e., noise and sleep interruptions). The other two groups ranked lack of knowledge/understanding as a top stressor. Finally, a one-way analysis of variance was performed which showed that the mean perceived stress scores among the groups was highest for the IABP group. The differences in scores between the other two groups was not significant. The researchers noted that the condition of the IABP group was more serious than that of the other patients and that they had been in the CCU longer. The researchers suggested that denial may have been used as a coping mechanism for the second and third groups. Several patients appeared to be anxious, but did not verbalize anxiety. Proximity to the IABP could also have been a significant factor relating to the stress perceived in the second group.

Conceptual framework

Being admitted to an Intensive Care Unit (ICU) for any reason produces reactions to the stressors which are present, and may result in further breakdown in the body system or even death. These potential or existing stressors, once identified, can be eliminated, managed, or at least understood more fully by the patient and the nurse by utilizing a systems approach to individualized patient care. The Neuman Systems Model was the conceptual framework chosen to direct this study which focussed on reducing physiologic responses to stressors and changes in emotional state using music as an intervention to achieve an optimal state of wellness. Neuman (1989) defined optimal system stability as "the best possible health state at any given time" (p. 25).

The Neuman Systems Model is an open systems model based on the concepts of stress and reaction to stress (Neuman, 1989). Neuman (1989) integrated the concepts of man (termed a client or client system), environment (broadly defined as all internal and external factors surrounding the client), health (optimal system stability), and nursing (a process of assisting the

client to retain, attain, and maintain optimal health through interventions) to describe the holistic, multidimensional, integrating systems of a person. Nursing can occur at any point when a stressor is identified. Primary intervention is provided when a risk is known to exist. The goal of secondary intervention is to protect the basic structure by strengthening the internal lines of resistance against the stressor. As the client is stabilized from reaction to the stressor, tertiary intervention is utilized to promote reconstruction of the client system.

The client in the ICU enters the health care system due to a reaction to or symptomatology from a stressor. A stressor, defined by Neuman (1989) is an environmental factor, either intrapersonal, interpersonal, or extrapersonal, which may disrupt the stability of a client system. He/she is then bombarded with additional stressors such as unfamiliar noise, intrusive procedures, separation from family, friends, and the routine of every day life, and others. All of these are capable of evoking a reaction within the client. According to Neuman, there is a circular

input, output, feedback mechanism between the client and the environment. In order for the client to optimize his/her health state, the client must stabilize his/her reactions to stressors and strengthen the lines of defense against future reactions in order to protect the basic structure (inner core) of the client system. Secondary interventions, brought about by the nursing process, are a means of stabilizing the client system (Neuman, 1989).

The Neuman Systems Model views the client as a system containing five essential variables. These variables (physiological, psychological, sociocultural, developmental, and spiritual) may individually or collectively be affected by a given stressor (Neuman, 1989). Nursing interventions are aimed at reducing stressor impact to increase resistance and stability.

The ICU environment as a whole was the stressor in this study. The impact of this stressor on the client produced physiological and emotional responses which impeded or at least retarded the regaining of stability and may even have threatened the core of the client system. The researcher utilized the secondary intervention of music to lessen the impact of the ICU

stressor, thus enabling the client to stabilize the lines of resistance and strengthen the normal lines of defense or coping mechanisms.

The Neuman Systems Model ". . . views nursing as being primarily concerned with defining appropriate action in stress-related situations or possible reactions of the client/client system" (Neuman, 1989, p.11). The literature discussed above revealed that selected music programs can be an effective way to reduce the reaction of clients to stressors. The studies reviewed above identified the ICU experience as being fraught with real and potential stressors which can be anticipated, identified, and their effect minimized. This study evaluated the effect of selected music programs as a secondary intervention to strengthen the lines of resistance against stressors in the ICU environment.

Assumptions

This study included the following specific assumptions:

1. Each patient as an individual was capable of a variety of physiological and emotional responses within a normal range.

2. Each of the numerous external and/or internal stressors of the ICU had its own potential for response by the patient.

3. The patient answered the instrument truthfully.

Hypotheses

In an attempt to determine the utilization of music as an intervention in the clinical setting, further research was needed to determine the effect of music on physiological parameters and the change, if any, in emotional state of patients. This study tested the following hypotheses:

1. Intensive care patients who use a specific 30 minute music listening program will demonstrate a significant difference between pre- and post-treatment

assessments of physiologic stress response as measured by heart rate while the control group patients will not.

2. Intensive care patients who use a specific 30 minute music listening program will demonstrate a significant difference between pre- and post-treatment assessments of physiologic stress response as measured by blood pressure while the control group patients will not.

3. Intensive care patients who use a specific 30 minute music listening program will demonstrate a significant difference between pre- and post-treatment assessments of physiologic stress response as measured by mean arterial pressure while the control group will not.

4. Intensive care patients who use a specific 30 minute music listening program will report improvement in emotional response between pre- and post-treatment assessments as measured by the Changes in Emotional State questionnaire while the control group will not.

Definition of terms

1) Nurse. A registered nurse practicing in the State of Nevada, in an Intensive Care Unit (ICU) caring for patients.

2) Patient. An individual who was hospitalized in the Intensive Care Unit (ICU) in stable condition.

3) Intervention. An attempt to deal with existing symptoms utilizing the clients internal and external resources.

4) Stressor. Disrupting force acting within or upon a patient.

5) Music listening program. A system including selected music tapes, a cassette recorder, and a headset with earphones.

6) Emotional response. The emotional response of the patient to a stressor measured by the Changes in Emotional State questionnaire.

7) Physiologic response. The physiological response of the patient to a stressor measured by heart rate, blood pressure, and/or mean arterial pressure.

8) Mean arterial pressure. The mean arterial pressure is the average blood pressure throughout the pressure pulse cycle (Guyton, 1971, p. 219).

CHAPTER III

METHODOLOGY

Research design

This study was a quasi-experimental control group design. A convenience sample of patients from the Intensive Care Units of a large southwestern metropolitan hospital was divided into experimental and control groups on an alternating basis.

Setting

The study was conducted in the Intensive Care Units at a large southwest metropolitan hospital. The 688-bed facility had 62 beds in four Intensive Care Units. The beds were all in private rooms with central cardiac monitoring. Visiting was restricted to family members at specified times. There were no telephones available in the rooms. The data were collected from May through July, 1991. In order to accommodate routine nursing care, data were collected between one and five in the afternoon.

Sample

A convenience sample of patients who met the following eligibility criteria were asked to participate in the study.

1. Patient must be conscious, oriented to time, place, and person, and non-respirator dependent.

2. Patient must not have received pain medication within two hours of the intervention as documented in the patient's medical record.

3. Patient must not have a hearing loss or impairment which requires a hearing aid.

4. Patient must speak and understand English evidenced by a verbal description of the study procedure after an explanation, and completion of the demographic questionnaire.

5. Patient will have been admitted in the ICU for more than 24 hours.

6. Patient will not be receiving antihypertensive or vasopressor medications as documented in the patient's medical record.

Fifty-one patients who met the above criteria were divided into experimental and control groups on an alternating basis beginning with a random start. The

researcher approached the patient to explain the purpose and procedure of the study, and obtain written consent (Appendix A) for voluntary inclusion into the study. The patient was not told which group he/she was in until after the consent form was signed. The consent form included assurance of patient confidentiality and freedom from harm. The patient was given the opportunity to refuse participation or to withdraw from participation in the study at any time. Approval of the study was obtained from the hospital Institutional Review Board and the University Human Subject Rights Committee.

Data collections methods

The data for this study was collected by the researcher through a self-reported demographic questionnaire (Appendix B), the patient's medical record, a nondirective, open-ended interview, and physiological parameter recordings taken from monitoring equipment in the Intensive Care Unit.

Techniques

This study involved two independent groups of 26 and 25 patients respectively. The physiological effect of the independent variable (selected music) was tested in terms of changes in heart rate (HR), blood pressure (BP), and mean arterial pressure (MAP). The emotional effect of selected music was tested in terms of the responses to the Changes in Emotional State questionnaire. The same data were collected from the control group who did not receive the music treatment. The physiological data collected was at the ratio level. The independent t test was used to test the difference between two independent group means in terms of some demographic variables. Demographic data were also analyzed by use of Pearson Correlation Coefficient and frequency distributions. The independent t test was used to examine the differences between the two groups on the dependent variables. The paired t test was used to test the hypotheses by comparing the difference between two means that resulted from pre- and post-intervention measures of the dependent variables from the same patients in each group. Demographic data collected were completed by the

patient and verified with the patient's medical record. This data included: age, sex, previous Intensive Care Unit experience, present diagnosis, educational level, length of time in the ICU, the patient's perceived severity of illness, and the type of ICU the patient was in. Frequency analysis was done to examine demographic variables for each group of patients.

The researcher conducted a pre- and post-intervention interview using the Changes in Emotional State questionnaire (Appendix C). The researcher recorded verbatim the responses of the patient to each question. When all of the questionnaires were completed, the researcher separated like answers into categories. The frequency of response in each category for pre- and post-intervention was compared for each subject and within each group.

Instruments

Physiological parameters of heart rate (HR), blood pressure (BP), and mean arterial pressure (MAP) were recorded utilizing the equipment in the Intensive Care Units. The equipment included: the DataScope Accutorr 4 which had a reported mean error of < 5mmHg with a

standard deviation of error of < 8mmHg. These maximum error specifications were within the standards established by the Association for Advanced Medical Instrumentation; the Space Labs 702 and Alpha PC which had a reported mean time between failure rate of < 3%; and Hewlett Packard 78342A. This equipment was used routinely throughout the ICU's. The calibration for the equipment was checked each shift by the staff nurse according to hospital policy. Although changes in the electrocardiogram (EKG) was not a parameter being considered in the hypotheses of this study, it was a routine measurement of cardiac activity used in the ICU. Because of the critical nature of the patient population of this study, the EKG was closely monitored during the treatment period by the ICU staff nurses and the researcher. The researcher has been an adult ICU staff nurse and taken courses in EKG interpretation.

The patient's emotional response was measured in a qualitative manner by use of a nondirective, open-ended questionnaire. The questionnaire was developed from the five themes of the Emotional Condition Rating Scale (ECRS) which are: emotional mood state, aloneness, anxiety/worry, perception of care and experience of

pain. Verbal cues and body language were also recorded by the researcher.

The ECRS was developed by Richards (cited in Updike & Charles, 1987) in 1972 at the Psychiatric Research Center in Baltimore, Maryland. The ECRS was an unpublished psychiatric test. The ECRS was the tool used in a study by Bonny (1983) titled, "Music Listening for Intensive Care Units: A Pilot Project". "Of the five categories in the ECRS, four showed significant changes from negative to more positive mood states following the music experience" (Bonny, 1983, p. 12). Updike (1990) chose to modify the ECRS keeping the five areas of interest listed above, but using a qualitative approach. The modified tool, Changes in Emotional State, was used in the 1990 study titled, "Music Therapy Results for ICU Patients". In telephone conversations, Phyllis Updike, R.N., DNS, stated that she chose to maintain the content of the ECRS, but wanted to add the richness of the patient's experience through subjective responses. She stated that the use of open-ended, nondirective questions allowed the patient freedom of expression unlike paper and pencil tools. Updike stated that utilizing the

same themes as the ECRS added validity to the value of those themes. This study utilized the Changes in Emotional State following the same method described by Updike.

The music chosen for the study was specifically selected by Updike (1990) due to the music's demonstrated effect of sedation. Sedative music is characterized by having a regular rhythm, consonance of harmony, predictable dynamics, and recognized instrumental and vocal timbre according to Gaston (cited in Bonny, 1983). The Music Rx tapes were developed by Dr. Helen Bonny, a registered music therapist, over many years of testing and research. She has studied the effects of music on the body and emotions with both normal and psychiatric patients, hospitalized cancer patients, and patients addicted to narcotics. Results of her testing demonstrated that ICU patients had a measurable reduction in heart rate after listening to the Music Rx programs. Psychological testing showed positive effects on depression and anxiety, and relief of pain for ICU patients using the Music Rx tapes. Bonny (1978) stated that certain musical compositions have been isolated

which provoke the relaxation response. Updike provided five Music Rx tape cassettes for the patients to choose from. This researcher was able to obtain two of the five Music Rx tapes for use in this study. The experimental (music) patients selected one tape for one 30-minute session of listening through earphones.

Procedure

Selection of the participants for the study was discussed with the charge nurse of the unit using information from the patient's hospital record to verify eligibility criteria. When the patient satisfied the criteria for admission into the study, he/she was approached by the researcher to explain the study procedure and to obtain written informed consent for voluntary inclusion into the study. The patients were divided into the experimental and control groups on an alternating basis beginning with the music intervention. The first group was determined by the toss of a coin. The heart rate (HR), blood pressure (BP), and mean arterial pressure (MAP) of each patient was recorded. The patient completed the demographic questionnaire and the researcher conducted the first

interview using the Changes in Emotional State questionnaire. The patient assigned to the experimental group chose a tape of classical or contemporary music from the Music Rx group available. The experimental group patient listened to 30 minutes of selected music from a tape through earphones and headset from a cassette recorder. After listening to the music, the patient was interviewed again by the researcher using the Changes in Emotional State questionnaire. The HR, BP, and MAP were recorded again. The control group patient followed the same procedure as the experimental group patients with the exception of listening to the music tape. The control group patient wore the headset with earphones connected to the tape recorder for 30 minutes, but the recorder was turned off. After completion of the study, the control group patients were given the option of listening to 30 minutes of the same taped music as the experimental group.

CHAPTER IV

RESULTS

Demographic data

The sample of Intensive Care patients in the study consisted of 51 adults ranging from 32 to 82 years of age with a mean age of 65.22 years (Table 1). Independent *t*-test results showed no significant difference between the men or women in either the experimental or control groups due to age (Table 2). There was no significant difference between the experimental and control groups in age (Table 2). There was a variety of diagnoses within the sample including myocardial infarction, suspected myocardial infarction, respiratory failure, congestive heart failure, cardiovascular disease, coronary artery disease, gastrointestinal bleeding, pneumonia, arrhythmias, and others (Table 3). Cardiac patients, particularly, had more than one diagnosis or reason (surgery) for being in the ICU, so that 67 diagnoses were identified on 51 total patients. The total sample was quite evenly divided between females (n = 25) and

Table 1

Mean Age in Years By Group and Sex

Group	Both		Music		non-Music	
	n	Mean Age	n	Mean Age	n	Mean Age
Males	26	65.80	16	65.44	10	66.44
Females	25	64.60	10	64.80	15	64.47
Combined	51	65.22	26	65.21	25	65.24

Table 2

Independent t Tests of Music and non-Music Groups on Age

Group	n	Mean Age	SD	t	p*
Music group	26	65.19	8.2	-0.02	.98
Non-music group	25	65.24	11.61		
Age of Men					
Music group	16	65.44	9.17	-0.27	.78
Non-music group	10	66.40	8.13		
Age of Women					
Music group	10	64.80	7.04	0.07	.94
Non-music group	15	64.47	13.67		

*p value two-tailed

Table 3

Frequency Distributions for Music and non-Music Groups By Diagnosis

Total N = 51 Music n = 26 non-Music n = 25

Diagnosis*	CHF	RF	MI	SUR	SUS MI	OTHER
Both	2	5	9	5	18	28
Music	1	3	6	1	8	15
non-Music	1	2	3	4	10	13

*Diagnosis Codes
CHF = Congestive Heart Failure
RF = Respiratory Failure
MI = Myocardial Infarction
SUR = Surgery
SUS MI = Suspected Myocardial Infarction
OTHER = Other

There may have been more than one diagnosis or reason for being in the ICU per patient

males (n = 26) (Table 4). In the music group (n = 26) 77% had been in the ICU before. ICU experience for the non-music group (n = 25) was 68% (Table 4). The patients were distributed on four Intensive Care Units (ICU)(Table 4). The majority of patients (74%) were from two Coronary Care Units. Since over half of the 67 listed diagnoses were cardiac related, this was not an unreasonable distribution. The number of days that each patient had been in the ICU at the time of the study varied from one to over 10 days. Frequency distributions revealed that the majority of patients in each group were in the ICU from two to five days at the time of the study with minimal differences between groups (Table 5). The majority (68%) of the sample had some college background or had completed high school (Table 6). The music group was more educated with 62% having some college or more education, whereas 40% of the non-music group had similar education. Over half (58.8%) of the patients perceived themselves to have severe symptomatology or to be severely ill, while the remaining patients perceived themselves to be moderately (25.4%) or mildly (13.7%) ill. One patient stated that she couldn't answer the question. Pearson

Table 4

Frequency Distribution for Music and non-Music Groups By Sex, ICU Experience, and Type of Unit

Group	Both		Music		non-Music	
	n*	%**	n	%	n	%
Sex						
Females	25	49	10	38	15	60
Males	26	51	16	62	10	40
Total	51	100	26	100	25	100
Prior ICU Experience						
Yes	37	73	20	77	17	68
No	14	28	6	23	8	32
Total	51	100	26	100	25	100
Intensive Care Unit						
Coronary I	21	41	11	42	10	40
Coronary II	17	33	8	31	9	36
Cardiovascular	6	12	2	8	4	16
Respiratory	7	14	5	19	2	8
Total	51	100	26	100	25	100

*n = frequency **% = percent

Table 5

Frequency Distribution for Music and non-Music Groups by Days in ICU at Time of Study

	1		2-3		4-5		6-7		8-9		>10	
Group	n	%	n	%	n	%	n	%	n	%	n	%
Combined	2	4	17	33	14	28	8	16	2	4	8	16
Music	2	8	8	31	7	27	3	12	1	4	5	19
non-Music	0	0	9	36	7	28	5	20	1	4	3	12

n = Frequency % = percent

Table 6

Frequency Distribution for Music and non-Music Groups by Education

	<8*		Some HS*		HS*		Some Col*		COL*		GRAD*	
Group	n	%	n	%	n	%	n	%	n	%	n	%
Both	1	2	9	18	15	29	20	39	5	10	1	2
Music	0	0	4	15	6	23	12	46	3	12	1	4
non-Music	1	4	5	20	9	36	8	32	2	8	0	0

n = Frequency % = percent

* Codes

<8 = eight years or less
Some HS = Some High School
HS = High School Graduate
Some COL = Some College
COL = College Graduate
GRAD = Graduate School

correlation revealed no significant coefficients between the two groups on age, education level, and the amount of time in the ICU. The correlation between age and days in the ICU did approach significance (r = .229, p = .053). The groups were not significantly different in frequency distribution of age, sex, diagnoses, prior ICU experience, type of unit, days in the ICU, or education.

In order to assess homogeneity between the experimental and control groups on the physiological parameters being tested, independent t-tests were done on pre-experiment heart rate, systolic and diastolic blood pressure, and mean arterial pressure. The mean heart rate for the experimental group was 85.31, and the mean heart rate for the control group was 82.56. This did not reflect a significant difference between groups (Table 7). The mean systolic blood pressure for the experimental group was 122.42 mmHg, and 120.68 mmHg for the control group. This was not a significant difference (Table 7). The mean diastolic blood pressure was also not significantly different between groups (t = 1.32, p = .09) (Table 7). The mean arterial pressure for the experimental group was

Table 7

Pre-experiment Independent t Tests of Group Differences for the Variables of Heart Rate, Blood Pressure, and Mean Arterial Pressure Between Music and non-Music Groups

Music group n = 26
Non-music group n = 25

Variable	Mean	SD	t	p*
Heart Rate				
Music	85.31	21.50	0.52	.30
Non-music	82.56	15.94		
Systolic Blood Pressure				
Music	122.42	15.60	0.37	.35
Non-music	120.68	17.67		
Diastolic Blood Pressure				
Music	70.92	11.03	1.32	.09
Non-music	66.02	10.55		
Mean Arterial Pressure				
Music	90.73	12.27	0.90	.18
Non-music	87.88	10.18		

*p value one-tailed

90.73 mmHg, and for the control group was 87.88 mmHg. Again, there was not a significant difference between the groups (Table 7). The experimental and control groups were not found to be significantly different at the beginning of the experimental period based on the physiological parameters of heart rate, systolic and diastolic blood pressure, and mean arterial pressure (Table 7).

Hypotheses

To test the hypothesis of whether ICU patients who use a specific 30 minute music listening program will demonstrate a significant difference pre- and post-treatment assessments of physiologic stress response as measured by heart rate, paired t tests were conducted between the groups. The mean heart rate for the experimental group increased slightly (1.26), after listening to music, but not significantly ($t = -1.31$, $p = .20$) (Table 8). The mean heart rate for the control group decreased minimally (0.72) (Table 8).

To test the hypothesis of whether ICU patients who use a specific 30 minute music listening program will

Table 8

Pre- and Post-experimental Paired t Tests of Group Differences for the Variables of Heart Rate, Blood Pressure, and Mean Arterial Pressure Between Music and non-Music Groups

Music group		n = 26	non-Music	n = 25	
Variable		Mean	SD	t	p*
Heart Rate					
Music	Pre	85.31	21.50	-1.31	.20
	Post	86.58	21.77		
non-Music	Pre	82.56	15.94	0.44	.33
	Post	81.84	16.06		
Systolic Blood Pressure					
Music	Pre	122.42	15.60	-0.64	.53
	Post	124.96	21.01		
non-Music	Pre	120.68	17.67	-0.02	.49
	Post	120.72	19.94		
Diastolic Blood Pressure					
Music	Pre	70.92	11.03	0.17	.43
	Post	70.65	8.85		
non-Music	Pre	66.92	10.55	-0.19	.42
	Post	67.28	11.50		
Mean Arterial Pressure					
Music	Pre	90.73	12.27	1.02	.25
	Post	88.88	10.20		
non-Music	Pre	87.88	10.18	0.36	.36
	Post	87.20	13.93		

*p value one tailed

demonstrate a significant difference pre- and post-treatment assessments of physiologic stress response as measured by blood pressure, paired *t* tests were conducted between the groups. There was an increase in the mean systolic blood pressure in the experimental group of 2.54 mmHg which was not significant ($t = -0.64$, $p = .528$). There was virtually no change in the mean systolic blood pressure of the control group (Table 8).

There was a downward change in the experimental group mean diastolic pressure of 0.27 mmHg, and an upward change in the control group mean diastolic pressure of 0.36 mmHg (Table 8). Neither change was significant.

To test the hypothesis of whether ICU patients who use a specific 30 minute listening program will demonstrate a significant difference pre- and post-treatment assessments of physiologic stress as measured by mean arterial pressure, paired *t* tests were conducted. The experimental group exhibited a decrease in mean arterial pressure of 1.846 mmHg (Table 8). The control group had a small decrease of

0.6 mmHg. Once again, neither of these changes were significant (Table 8).

Independent *t* tests were used to determine that there were no significant differences between the experimental and control groups on the post-experiment parameters of heart rate, systolic and diastolic blood pressure, and mean arterial pressure (Table 9).

In summary, the assumption of normal distribution of the groups was met as evidenced by the *F*-values not reaching critical significance level on the independent *t* test of heart rate, systolic and diastolic blood pressure, and mean arterial pressure. There was not a significant difference between groups after the experimental period on the physiological parameters tested. The paired *t*-value levels on the physiological parameters of heart rate, systolic and diastolic blood pressure, and mean arterial pressure did not reach the .05 level for either the experimental or control groups. Although changes in heart rate and diastolic blood pressure approached the significance level for the experimental group, the null hypotheses must be retained.

Table 9

Post-experiment Independent t Tests of Group Differences for the Variables of Heart Rate, Blood Pressure, and Mean Arterial Pressure Between Music and non-Music Groups

Music group n = 26
Non-music group n = 25

Variable	Mean	SD	t	p*
Heart Rate				
Music	86.58	21.77	0.88	.19
Non-music	81.84	16.06		
Systolic Blood Pressure				
Music	124.96	21.00	0.74	.23
Non-music	120.72	19.94		
Diastolic Blood Pressure				
Music	70.65	8.85	1.18	.12
Non-music	67.28	11.50		
Mean Arterial Pressure				
Music	88.88	10.21	0.49	.31
Non-music	87.20	13.93		

*p value one-tailed

The final hypothesis tested in this study was whether ICU patients who use a specific 30 minute music listening program will report improvement in emotional response between pre- and post-treatment assessments as measured by the Changes in Emotional State questionnaire (Appendix C). The verbal responses of each patient to the five questions of the Change in Emotional State questionnaire were recorded verbatim. The responses were grouped together and tabulated in frequency distributions by the researcher. To establish inter-rater reliability, a second reader independently reviewed all of the responses from each group. The second reader, a M.S. prepared nurse, also grouped like responses and tabulated the responses into frequency distributions. A consensus was reached between the researcher and the second reader on minor differences in categories titles. There were 26 subjects in the music group and 24 subjects in the non-music group. One subject from the non-music group did not complete the interviews.

There were more positive responses to how the patient was feeling emotionally after listening to music in all categories except "excellent", where there

was a 3.8% decline (figure 1). There was a decline in anxiety of 7.7% reported by the music group. The "other" category remained unchanged. The non-music group reported a decline in all categories except "good", "anxious", and "other" (figure 2). There was a 15.4% increase in "good" and a 8.3% increase in "anxious" feelings. The "other" category remained the same. One patient did not answer this question.

The experimental group indicated less feelings of loneliness after listening to music (figure 3). There was a decrease of 7.7% in positive answers to feelings of loneliness after listening to music, with a corresponding increase of 15.4% in negative responses to feelings of loneliness after listening to music. There was a shift of 11.4% more patients answering the question after listening to the music. One patient (3.8%) reported "less" feelings of loneliness after the music. The control group indicated similar changes in feelings of loneliness with a decrease of 4.2% in "yes" answers, and an increase of 4.2% in "no" answers (figure 4).

There was a positive shift (7.7%) in feelings of nervousness or worry in the experimental group

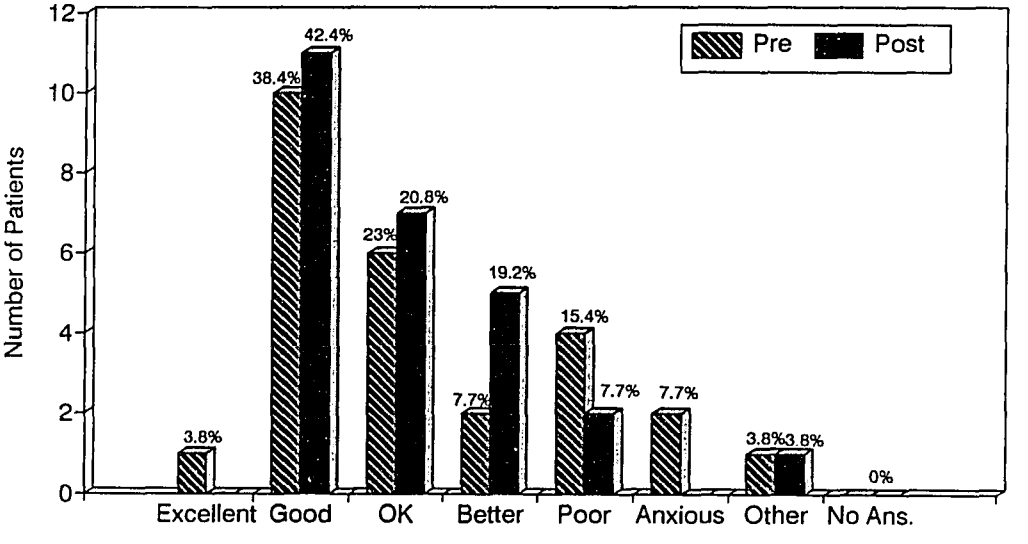

Figure 1. Difference between pre- and post-experiment responses to Changes in Emotional State questionnaire for experimental group. Question 1. How are you feeling today (emotionally)? (n = 26)

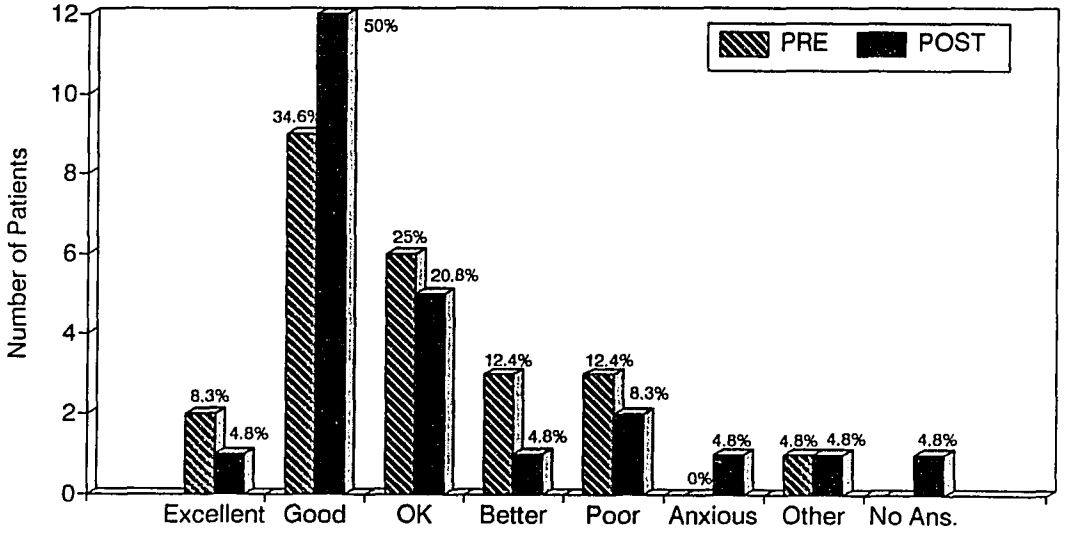

Figure 2. Difference between pre- and post-experiment responses to Changes in Emotional State questionnaire for control group.

Question 1. How are you feeling today (emotionally)?

(n = 24)

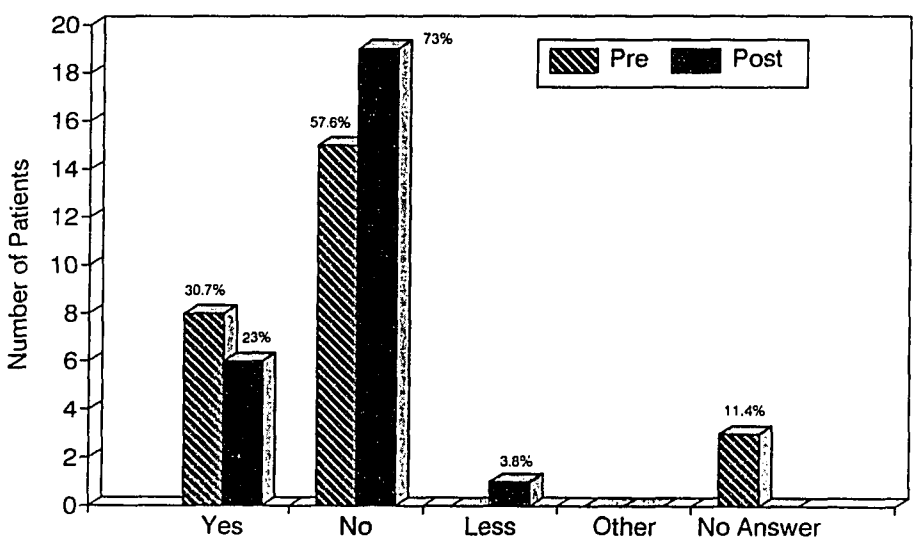

Figure 3. Difference between pre- and post-experiment responses to Changes in Emotional State questionnaire for experimental group. Question 2. Are you feeling alone or lonely?

(n = 26)

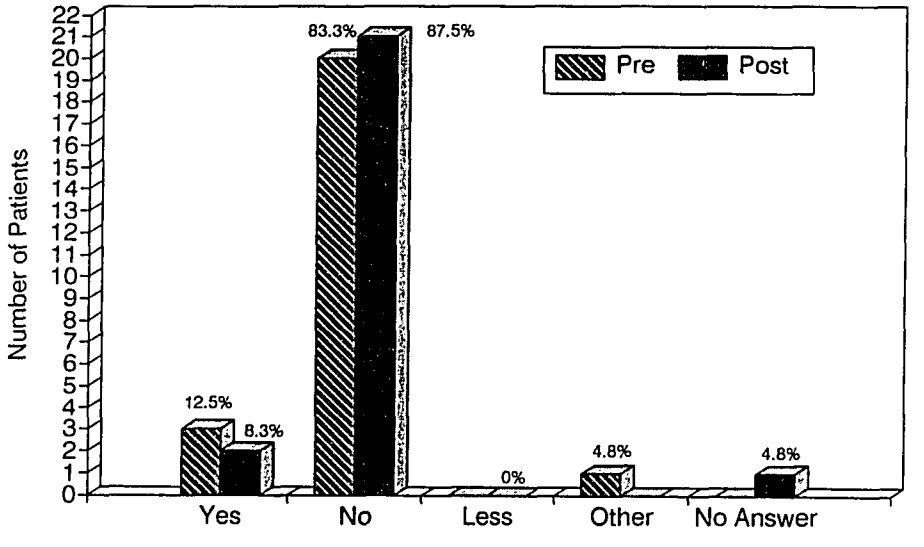

Figure 4. Difference between pre- and post-experiment responses to Changes in Emotional State questionnaire for control group. Question 2. Are you feeling alone or lonely? (n = 24)

(figure 5). The feelings of nervousness in the control group remained the same except for a decrease in "other" and an increase in "no answer" categories by 4.8% each (figure 6).

There was a slightly positive shift in attitude about the care they were receiving in the experimental group (figure 7). There was an increase of 3.8% in the "excellent" category, and a 15.3% increase in the "OK" category. Conversely, there was an 11.6% decrease in the "good" category. There was also a 7.6% decrease in "other" responses. The control group reported slightly more negative responses about the care they were receiving after the experimental period (figure 8). The "excellent" and "other" categories remained the same. There was a decrease in the "good" and "OK" categories by 4.1% and 3.5%, respectively. Fewer patients (8.3%) answered the question after the experimental period.

The experimental group acknowledged less pain after listening to music (figure 9). There was a 7.6% decrease in "yes" responses, and an increase of 3.8% in "no" responses. There was a 3.8% decrease in the "slight" category, and a 7.6% increase in the "other"

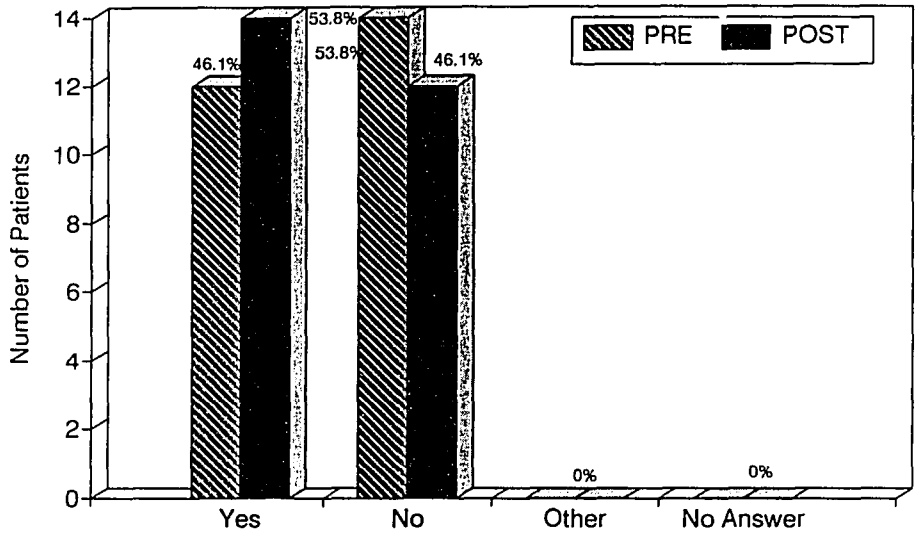

Figure 5. Difference between pre- and post-experiment responses to Changes in Emotional State questionnaire for experimental group. Question 3. Are you feeling nervous or worried?

(n = 26)

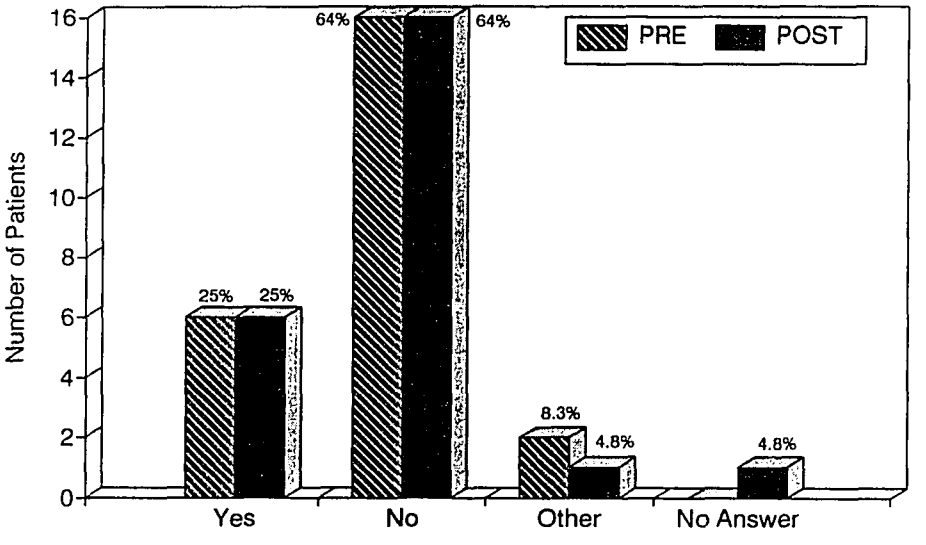

Figure 6. Difference between pre- and post-experiment responses to Changes in Emotional State questionnaire for control group. Question 3. Are you feeling nervous or worried?

(n = 24)

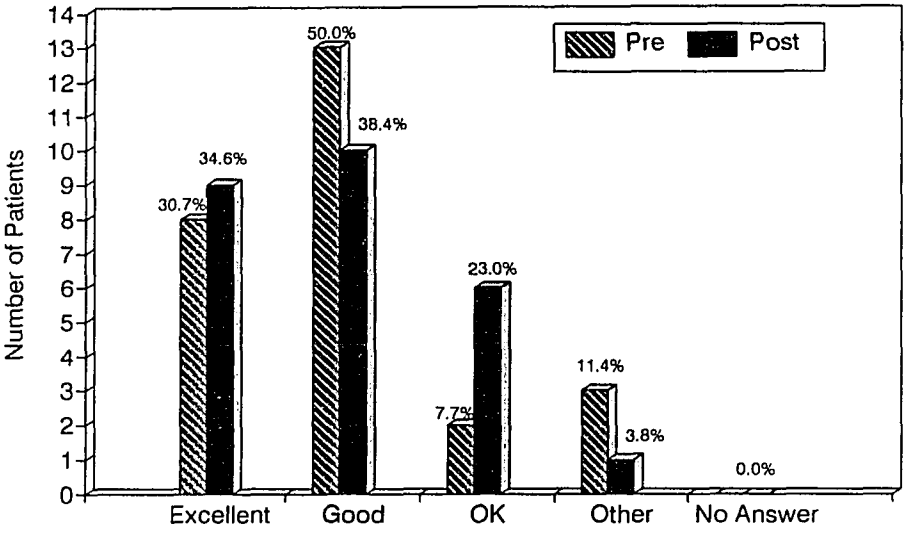

Figure 7. Difference between pre- and post-experiment responses to Changes in Emotional State questionnaire for experimental group. Question 4. How do you feel about the care you are receiving?

(n = 26)

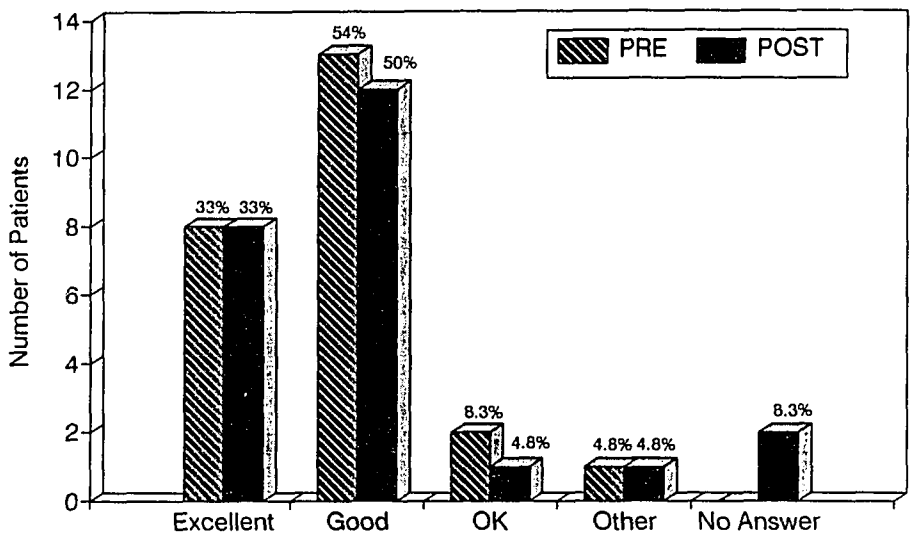

Figure 8. Difference between pre- and post-experiment responses to Change in Emotional State questionnaire for control group. Question 4. How do you feel about the care you are receiving?

(n = 24)

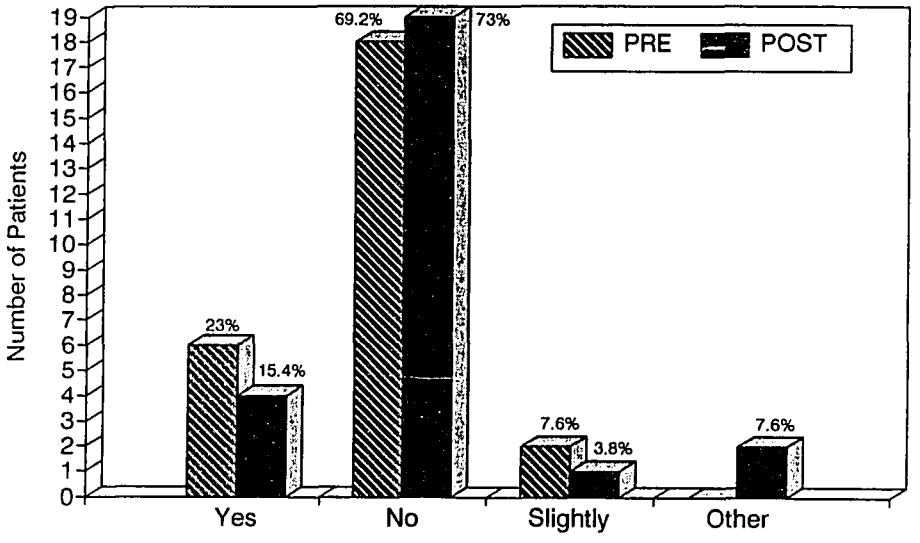

Figure 9. Difference between pre- and post-experiment responses in Changes in Emotional State questionnaire for experimental group. Question 5. Are you in pain?

(n = 26)

category. The control group reports of pain indicated a 4.2% decrease in "yes" answers, an 8% decrease in "no" answers, and a 4.2% increase in the "slight" category (figure 10). There was an 8.3% increase in the "no answer" category.

In order to reject the null hypothesis and state that there was a significant difference between music and non-music groups on pre- and post-treatment assessments as measured by the Changes in Emotional State questionnaire, data that could demonstrate quantity was required. That was not possible using the Changes in Emotional State questionnaire, so that a research question should have been proposed rather than a hypothesis. From the qualitative data gathered, it was possible to state that there was an improvement in all categories except one in emotional state in the music group following use of a 30 minute specific listening program between pre- and post-treatment assessments measured by the Changes in Emotional State questionnaire. It was not possible to state how much of an improvement was perceived, nor estimate how likely this improvement may have occurred by chance.

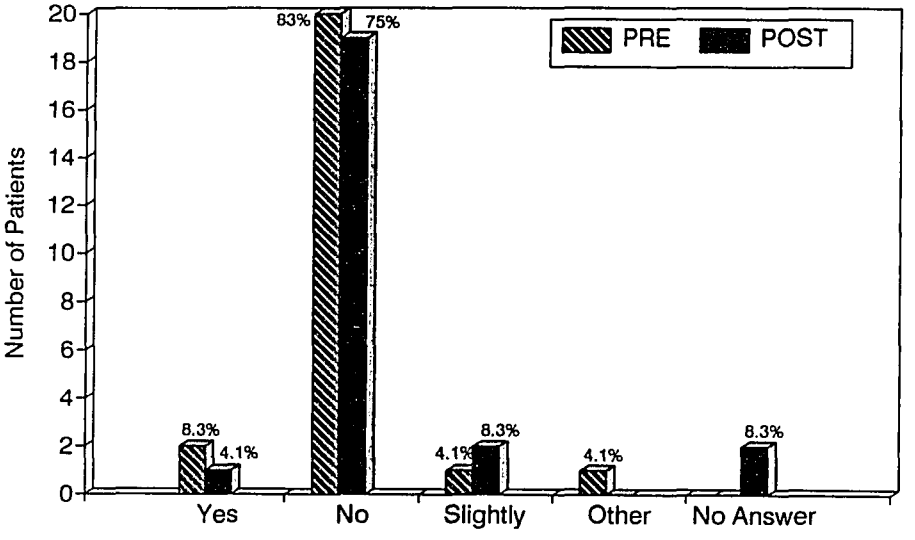

Figure 10. Difference between pre- and post-experiment responses to Changes in Emotional State questionnaire for control group. Question 5. Are you in pain?

(n = 24)

Other Results

Due to the critically ill nature of the patients, the electrocardiogram (EKG) of each patient was monitored continuously during the experimental period by the nursing staff and the researcher. There were no significant changes in readings noted.

Many unsolicited comments made during the post-experiment interviews about the music were positive. Four patients (15.3%) stated that the music was very relaxing and they enjoyed it very much. One patient commented that the tape was too long. One non-music patient liked the headphones because other noise was blocked out. One non-music patient stated that the headphones with no noise made her more anxious and she removed them before the time was completed.

Obvious nonverbal behavior was recorded during the pre- and post-experiment interviews by the researcher. Four experimental group patients and one control group patient were sleeping when the study time was over. Three experimental group patients smiled with a more relaxed facial expression after the music. There were

five experimental group patients who exhibited more relaxed body positions and facial expressions after listening to the music.

In summary, qualitative evaluation of the data collected using the Changes in Emotional State questionnaire showed that there was an improvement in the emotional state of patients who listened to selected taped music with the exception of the category of nervousness or worry. Documentation of nonverbal cues reinforced verbal responses.

Eight patients declined to participate in the study. Reasons for non-participation included: too tired (2), headache (1), didn't like music (2), sounded too involved (2), and didn't want to sign the consent (1). Some patients who met the criteria, were assessed to be "too sick" or unstable to participate in the study by the charge nurse of the unit, and were not approached.

In summary, there was not a significant difference between pre- and post-treatment assessments of the physiological stress response as measured by heart rate, blood pressure, and arterial mean pressure of ICU patients who listened to a specific 30 minute music

program. There was a positive change in emotional state including a decrease in anxiety, decreased feelings of loneliness, slightly increased sense of nervousness or worry, more positive feelings about care received, and a decreased perception of pain following 30 minutes of specific music listening as measured by the Changes in Emotional State questionnaire by the music group.

CHAPTER V

DISCUSSION

The results of this study indicated that utilization of music with Intensive Care Unit (ICU) patients as a means of lowering physiological responses to the stressors of being in the ICU was not successful. There were, however, factors which may have influenced those results which bear further investigation.

In order to avoid making a type II error, power analysis was considered. The sample size of the experimental group was small (n = 26). The alpha size would have to be increased too far for significance, thus the risk of rejecting the null hypotheses falsely.

To test the power, multivariate analysis of variance (MANOVA) was performed. The values for power were low for each of the physiological parameters being investigated.

Another component of power, effect size was expected to be small. The literature has reported a variety of lengths of time of listening for music to be

effective. Also more than one exposure to the music might have influenced its effect. The researcher did not prohibit any interruptions during the listening time. Twelve of the patients in the experimental group (n = 26) had some kind of interruption during the listening time. These interruptions consisted of doctor visits, needing nursing assistance, procedures, visitors, or lunch being served. The ICU setting did not lend itself to 30 minutes of totally uninterrupted rest. Restricting interruptions may have increased the effect that music had on the patients.

Physiological data

The finding of nonsignificant changes in heart rate and blood pressure supported the results reported by Zimmerman, Pierson, and Marker (1988). Other similarities between these studies included group size (n = 25) and length of listening time (30 minutes). Davis-Rollans and Cunningham (1987) reported significant changes in heart rate, although there was no control group and music listening sessions were longer (42 minutes).

The report of significantly lowered systolic blood pressure and mean arterial pressure by Updike (1990) was not substantiated by this study. Bonny (1983) reported a significant decrease in heart rate and a trend toward a decrease in systolic and diastolic blood pressure. This study would support only the trend in the decrease of diastolic blood pressure. The patient population for the Bonny (1983) pilot study was not secured, and inclusion into the study was at the discretion of the nurses or physician in charge. Thus, it was difficult to directly compare the results of these groups.

Patients were excluded from the study if they were receiving vasopressors or antihypertensive medications because of the effect of those drugs on the parameters being tested. Many patients (particularly those with cardiac related diagnoses) were receiving one of those medications in the first 24 to 48 hours after admission, thus excluding them from the study. Other studies (Guzzetta, 1989; Zimmerman, 1988; Davis-Rollans and Cunningham, 1987; Updike and Charles, 1987; and Updike, 1990) which included physiological parameters of heart rate and/or blood pressure noted the types and

frequency of specific medications being used, but did not exclude patients who were receiving those drugs.

Exclusion of those patients became more controversial with the knowledge that anxiety levels of ICU patients are increased especially at admission and transfer from the ICU (Bolwerk, 1990).

Psychological data.

Utilization of the Changes in Emotional State questionnaire was valuable to this study. Patients were able to express their feelings in their own words without suggestions as in prepared questionnaires. Freedom of expression, however, did make analysis of emotional state more difficult. Although like answers could be grouped together, the amount of difference or change was not measurable. The researcher did not ask for clarification or more information in an attempt to maintain consistency and decrease bias. Therefore, many questions were answered with "yes" or "no". Non-verbal cues, particularly facial expressions, suggested that had further questioning been pursued, more definitive responses may have occurred. The

"Hawthorne" effect was also a possible threat to influencing the patient's responses.

Responses to the Changes in Emotional State questionnaire supported the work of Bonny (1983), Updike and Charles (1987), and Updike (1990) with the exception of feelings of nervousness or worry. The demographic data revealed that over 50% of both the experimental and control groups had been in an ICU before. They may have started with artificially low feelings of worry or nervousness due to that experience.

Bolwerk (1990) stated that denial has been identified as a coping mechanism used by coronary patients in managing the stress of their illness. Since the majority of the patients in this study had a diagnosis which was cardiac in nature, denial may have been used as a coping mechanism. Thus, the reported emotional state of some patients may have been skewed.

In other areas, the experimental group did indicate improved feelings of emotional state, less feelings of loneliness, a better attitude toward the care they were receiving, and less pain after listening to music.

Helton, Gordon, and Nunnery (1980) identified sleep deprivation as a stressor for ICU patients. Fifteen percent of the experimental group were asleep after listening to music. Although it cannot be directly concluded that music caused sleep to occur in these patients, it may have contributed to a more relaxed state. This in turn, would allow the patient to sleep.

Too much noise was identified by Wilson (1987) as being a stressor for patients in the ICU. One of the non-music group patients stated that the headphones blocked out ICU noise, which was helpful, while another in the same group didn't like too much quiet. All of the rooms in the Intensive Care Units were private. The doors were often closed, at least partially, to the hallway, so that noise may not have been perceived as a major stressor to these patients in this setting.

Conclusions

This study investigated physiological and psychological variables of the client system included in the Neuman Systems Model as they respond to the stressor ICU environment. Although the physiological

responses to the intervention of music did not show a significant decline in the parameters of heart rate, blood pressure, and mean arterial pressure, there was a trend in that direction. The changes in psychological responses did indicate that there was a more positive emotional state, which in turn led to stabilizing the lines of resistance and strengthening the normal lines of defense within the client system. The lack of significance in the change of the physiological parameters was influenced by interruptions during the experimental period. The patients who were more critically ill in terms of needing stabilizing medications, may have shown more significant changes in physiological parameters with relaxation, but were excluded from the study. Use of the Changes in Emotional State questionnaire promoted more interaction with the patient in terms of responses. Patients who were not willing to complete paper and pencil questionnaires, were willing to talk. In addition, nonverbal cues were strong indicators of how the patient felt and must be taken into consideration in communication with patients.

Implications for nursing practice

The goal of Neuman's model is stability between the patient and the internal and external environment. This study has shown that listening to sedative music may be an effective intervention in helping a patient in an Intensive Care Unit perceive an improved state of well-being. This would strengthen the patient's defense against stressors in the ICU environment. Listening to music may help patients relax and sleep which is another road to regaining stability. It is a noninvasive, inexpensive means of helping ICU patients feel better emotionally. The use of headphones allowed for individually selected music for the patient without disturbing other patients or staff.

Providing the opportunity of listening to taped music can offer the ICU patient an element of control. The patient can decide when to listen and select the type of sedative music preferred. Smith (1986) identified the importance of providing normal sensory input in the ICU setting as well as providing the patient a means of controlling that environment. The patients in the non-Music group were given the option of choosing a tape and listening to it for 30 minutes

after the interviews were completed. Forty percent of that group (n = 25) acted on that option which indicated an interest in music in the hospital setting. Perhaps their motivation for listening to music was one of control, belief in the relaxing effect of music, curiosity, or just as a means of diversion.

Many staff nurses were enthusiastic about having their patients listen to the music. The nurses stated that listening to music would benefit their patient. Acceptance of music listening as an intervention by the staff nurses could increase its usage. Presented with a positive attitude, music listening would be more readily accepted by the patient.

The nursing staff also expressed interest in a similar program to help reduce their anxiety and stress levels. This supported similar suggestions made by Updike (1990).

Recommendations for further study

There is evidence, supported by this study, that ICU patients benefit from specific music programs.

Further study might include patients who are stable but require mechanical ventilation and patients in isolation.

Replication of this study would be improved in several ways. A larger sample size would help to increase power. More control over interruptions would help to increase effect size. Also, repeating the listening sessions might help the patient to relax more easily. Revision of the Change in Emotional State questionnaire so that more quantitative data would be generated would add more weight to the findings, but would run the risk of adding stress to the patient and the loss of spontaneity of expression. A method of clarification and/or explanation of answers that would not bias the response is indicated.

Many Intensive Care Units have radios which provide background music. Does the music encourage a calm atmosphere or add to the frustration at times of crisis? Does background music add to the noise level creating more stress for the staff and patients?

There are many areas in which investigation is needed to expand the use of music as an intervention for patients and nurses.

APPENDIX A: INFORMED CONSENT

CONSENT FORM

Music Therapy for Intensive Care Patients

CONSENT TO PARTICIPATE IN A RESEARCH STUDY
UNIVERSITY OF NEVADA, LAS VEGAS

Title of Study: Music Therapy Results for Intensive Care Unit Patients

Purpose

You are being asked to participate in a research study. I hope to learn if listening to sedative music is helpful to the patient who is in the Intensive Care Unit. Because you are a patient in the Intensive Care Unit, I would like to include you in this study.

Procedure

If you decide to volunteer, you will be asked to listen to sedative music from a cassette recorder through a headset with earphones for 30 minutes, or wear the headset with earphones with the cassette recorder turned off for 30 minutes. Your heart rate and blood pressure will be recorded before the 30 minute period. The investigator will ask you five questions about how you are feeling emotionally before the 30 minute period. After 30 minutes, your heart rate and blood pressure will be recorded again, and the investigator will ask you the same five questions about how you are feeling emotionally. If you are in the music listening group, you will be able to select one of two tapes for the listening period. If you are in the non-music listening group, at the end of the study you may listen to any of the tapes used in the study for 30 minutes if you desire to do so.

Risks

Listening to music through a headset while you are a patient in the Intensive Care Unit offers minimal risks. If you feel uncomfortable wearing the headset at any time, you may remove it and stop the study.

Benefits

It may be found from this study that music can be used to help patients feel better emotionally during their stay in the Intensive Care Unit.

Confidentiality

Every attempt will be made to maintain complete confidentiality of your participation in this study. You will be asked for demographic information, which will be verified using your hospital medical record. All of the data collected will be presented as group data. All of the data will be secured under lock and accessible only to the investigator. The information obtained in this study will be published in the investigator's thesis submitted to the University of Nevada, Las Vegas.

Costs/Compensation

There is no cost to you for participation in this study.

Right to Refuse or Withdraw

You may refuse to participate and still receive the care you would receive if you were not in the study. You may change your mind about being in the study and withdraw from the study at any time.

Questions

If you have any questions, please ask me. If you have additional questions later, you may contact the investigator, Nita Johnson, R.N., through the Graduate Office at the University of Nevada, Las Vegas. Any further questions, comments or concerns about the study or the informed consent process may be addressed to the Office of the Graduate Dean, University of Nevada, Las Vegas.

You will be given a signed and dated copy of this form to keep. Results of this study are available upon request from the investigator.

YOUR SIGNATURE, BELOW, WILL INDICATE THAT YOU HAVE DECIDED TO VOLUNTEER AS A RESEARCH SUBJECT AND THAT YOU HAVE READ THE INFORMATION PROVIDED ABOVE.

_____ _____
Signature of Participant Date

_____ _____
Signature of Investigator Date

NJ
2/91

APPENDIX B: DEMOGRAPHIC AND SITUATIONAL DATA

Music non-Music

CCU I CCU II CVICU RICU

DEMOGRAPHIC QUESTIONNAIRE

Please complete the following questions.

Age _____ Sex: Male ___
Female ___

Educational level:
less than 8th grade _____
completed 8th grade _____
some high school _____
completed high school _____
some college _____
completed college _____
completed graduate school _____

Present diagnosis (Why you are in the hospital now?)

_____Myocardial infarction (Heart attack)

_____Suspected myocardial infarction (chest pain)

_____Respiratory failure (breathing problem)

_____Surgery

_____Congestive heart failure

_____Other_____

How would you rate the severity/intensity of your present illness:

_____ Mild pain; observation only

_____ Moderate pain; moderate symptoms

_____ Severe pain; severe symptoms

_____ Uncertain prognosis; terminal status

How long have you been in the Intensive Care Unit?

1 day _____
2-3 days _____
4-5 days _____
6-7 days _____
8-9 days _____
10 or more days _____

Have you been in an Intensive Care Unit before? Yes No
If yes, how long ago and for what?_____

Do you like to listen to music? yes _____ no _____
If yes, what type of music do you listen to most often?

Classical _____
Popular/Easy listening _____
Jazz _____
Country _____
Rock 'n Roll _____

APPENDIX C: CHANGES IN EMOTIONAL STATE QUESTIONNAIRE

Pre_____
Post____

CHANGES IN EMOTIONAL STATE

1. How are you feeling today (emotionally)? _____

_____

Non-verbal or body language cues _____

_____

2. Are you feeling alone? _____

_____

Non-verbal or body language cues _____

_____

3. Are you feeling nervous or worried? _____

_____

Non-verbal or body language cues _____

_____

4. How do you feel about the care you are receiving?

_____

Non-verbal or body language cues _____

_____

5. Are you in pain? _____

Non-verbal or body language cues _____

_____

NJ
2/91

References

Benson, H. (1975). The Relaxation Response. New York: Wm. Morrow & Company, Inc.

Benson, H. (1977). Systemic hypertension and the relaxation response. New England Journal of Medicine, 296, 1152-1156.

Binnings, E.B. (1987). The effect of an auditory distraction on anxiety in ambulatory surgical patients experiencing regional anesthesia. Journal of the American Association of Nurse Anesthetists, 55(4), 333-335.

Bolwerk, C.A. (1990). Effects of relaxing music on state anxiety in myocardial infarction patients. Critical Care Quarterly, 13(2), 63-72.

Bonny, H.L. (1978). The Role of Taped Music Programs in the Guided Imagery (GIM) Process. Baltimore, ICM Press, 1978.

Bonny, H.L. (1983). Music listening for intensive coronary care units: a pilot project. Music Therapy, 3(1), 4-16.

Bullock, B.L., & Rosendahl, P.P. (1984). Pathophysiology: Adaptations and Alterations in Function. Boston: Little, Brown and Company.

Cook, J.D. (1981). The therapeutic use of music: a literature review. Nursing Forum, 20(3), 252-266.

Davis-Rollans, C., & Cunningham, S. (1987). Physiologic responses of coronary care patients to selected music. Heart and Lung, 16(4), 370-376.

Diekstra, R.F.W., Stubbe, L.Th. F.L., Willemsteyn, B. (1986). ICU Sensory Deprivation. Nursing Success Today, 3(6), 21-25.

Durham, L., & Collins, M. (1986). The effect of music as a conditioning aid in prepared childbirth education. Journal of Obstetrical and Gynecological Nursing, May/June, 268-270.

Frank, J.M. (1985). The effects of music therapy and guided visual imagery on chemotherapy induced nausea and vomiting. Oncology Nursing Forum, 12(5), 47-52.

Gardner, W., Licklider, J.C.R., & Weisz, A.Z. (1960). Suppression of pain by sound. Science, 132, 32-33.

Guyton, A.C. (1986). Textbook of Medical Physiology (7th ed.). Philadelphia: W.B. Saunders Company.

Guyton, Arthur (1971). Basic Human Physiology: Normal Function and Mechanisms of Disease. Philadelphia: W.B. Saunders Company.

Guzzetta, C.E. (1989). Effects of relaxation and music therapy on patients in a coronary care unit with presumptive acute myocardial infarction. Heart and Lung, 18(6), 609-616.

Harvey, A.W., & Rapp, L. (1988). Music soothes the troubled soul. . . . AD Nurse, March/April, 19-23.

Helton, M.C., Gordon, S.H., & Nunnery, S.L. (1980). The correlation between sleep deprivation and the intensive care unit syndrome. Heart and Lung, 9(3), 464-468.

Jacob, S. (1986). Soothing the ragged edge of pain. The American Journal of Nursing, 86(9), 1034.

Jacobsen, E. (1976). You Must Relax. New York: McGraw-Hill.

Kaempf, G., & Amodei, M. (1989). The effects of music on anxiety. Association of Operating Room Nurses Journal, 50(1), 112-118.

Locsin, R. (1981). The effect of music on the pain of selected post-operative patients. Journal of Advanced Nursing, 6, 19-25.

Moss, V.A. (1988). Music and the surgical patient: the effect of music on anxiety. Association of Operating Room Nurses Journal, 48(1), 64-69.

Mullooley, V.M., Levin, R.F., & Feldman, H.R. (1988). Music for postoperative pain and anxiety. Journal of the New York State Nurses Association, 19(3), 4-7.

Neuman, B. (1989). The Neuman Systems Model (2nd ed.). Norwalk, CT: Appleton & Lange.

Patacky, M.G., Garvin, B.J., & Schwirian, P.M. (1985). Intra-aortic balloon pumping and stress in the coronary care unit. Heart and Lung, 14(2), 142-148.

Peretti, P.O., & Zweifel, J. (1983). Affect of musical preference on anxiety as determined by physiological skin responses. Acta Psychiatrica Belgium, 83, 437-442.

I Samuel 16:23. New American Standard Bible (1973). Philadelphia: A.J. Holman Company.

Sayk, L. (1985). The effect of music on anxiety in preoperative patient. Unpublished manuscript, University of Evansville, School of Nursing & Health Sciences, Evansville, IN.

Simpson, T.F., Armstrong, S., & Mitchell, P. (1989). American Association of Critical-Care Nurses demonstration project: patients' recollections of critical care. Heart and Lung, 18(4), 325-332.

Smith, J. (1986). Patient responses to the critical care setting. In C.M. Hudak, B.M. Gallo, & T. Lohr (Eds.), Critical Care Nursing (4th ed.) (pp. 43-55). Philadelphia: J.B. Lippincott Company.

Steelman, V.M. (1990). Intraoperative music therapy. Association of Operating Room Nurses Journal, 52(5), 1026-1034.

Thelen, L.A., Davie, J.K., & Urden, L.D. (1990). Self-concept alterations. Textbook of Critical Care Nursing: Diagnosis and Management (pp.827-853). St. Louis: C.V. Mosby Company.

Updike, P. (1990). Music therapy results for ICU patients. Dimensions of Critical Care Nursing,9 (1), 39-45.

Updike, P., & Charles, D. (1987). Music Rx: physiological and emotional responses to taped music programs of preoperative patients awaiting plastic surgery. Annals of Plastic Surgery, 19(1), 29-33.

Vanson, R.J., Katz, B.M., & Krekeler, K. (1980). Stress effects on patients in critical care units from procedures performed on others. Heart and Lung, 9(3), 494-497.

Wilson, V.S. (1987). Identification of stressors related to patients' psychologic responses to the surgical intensive care unit. Heart and Lung, 16(3), 267-273.

Zimmerman, L.M., Pierson, M.A., & Marker, J. (1988). Effects of music on patient anxiety in coronary care units. Heart and Lung, 17(5), 560-566.

Ziporyn, T. (1984). Music therapy accompanies medical care. Journal of the American Medical Association, 252(8), 986-987.