

2000

The Effects of Music on Pain and Anxiety During Intravenous Insertion in the Emergency Department

Paula R. Nichols
Grand Valley State University

Follow this and additional works at: <http://scholarworks.gvsu.edu/theses>

 Part of the [Nursing Commons](#)

Recommended Citation

Nichols, Paula R., "The Effects of Music on Pain and Anxiety During Intravenous Insertion in the Emergency Department" (2000).
Masters Theses. 620.
<http://scholarworks.gvsu.edu/theses/620>

This Thesis is brought to you for free and open access by the Graduate Research and Creative Practice at ScholarWorks@GVSU. It has been accepted for inclusion in Masters Theses by an authorized administrator of ScholarWorks@GVSU. For more information, please contact scholarworks@gvsu.edu.

**THE EFFECTS OF MUSIC ON PAIN AND ANXIETY
DURING INTRAVENOUS INSERTION
IN THE EMERGENCY DEPARTMENT**

By

Paula R. Nichols

A THESIS

**Submitted to
Grand Valley State University
In partial fulfillment of the requirements for the
Degree of**

MASTER OF SCIENCE IN NURSING

Kirkhof School of Nursing

2000

Thesis Committee Members:

Kay Setter-Kline, Ph.D., R.N.

Susan J. Owens, MSN, R.N.

Jeff Steffey, R.Ph., MBA

ABSTRACT

THE EFFECTS OF MUSIC ON PAIN AND ANXIETY DURING INTRAVENOUS INSERTION IN THE EMERGENCY DEPARTMENT

By

Paula R. Nichols

The majority of patients presenting to the emergency department (ED) are anxious and experiencing some degree of pain. Betty Neuman's Neuman system model, provided the theoretical framework to explore and describe the effects of music on the pain and anxiety experienced during peripheral intravenous (IV) insertion in the ED. A convenience sample of 41 subjects completed pain and anxiety visual analogue scales as well as blood pressure and pulse monitoring before and after IV insertion. Twenty-one of those subjects received music during the intervention.

An analysis of covariance was performed for post-procedure pain, anxiety, pulse, and blood pressure. Anxiety was significant ($F = 10.39$; $p = 0.003$) in post-procedure analysis between groups. A paired t-test demonstrated significant improvement within the intervention group for pain ($t = 2.742$; $df = 20$; $p = 0.013$) and anxiety ($t = 3.049$; $df = 20$; $p = 0.006$). In addition, diastolic blood pressure was trending with $p = 0.059$.

DEDICATION

I dedicate this research to my husband, Brian and our children, Shelby and Jason.

Their love and support allowed me to pursue this dream.

ACKNOWLEDGMENTS

The author wishes to acknowledge the efforts, experience, and support of many people. This ambitious project could not have been undertaken without them. I am grateful for the expertise of Kay Setter-Kline, Ph.D., R.N., who served as the chairperson of my thesis committee. She always managed to push me towards the light every time I was stuck in the tunnel. I also sincerely appreciate the contributions of my thesis committee members: my dear friend, Susan J. Owens, M.S.N., R.N., who originally suggested this topic. Her broad experience with holistic nursing care was invaluable. Also, thanks to Jeff Steffey, R.Ph., M.B.A., for his expertise with pain management and his true commitment to this project. I value Linda Scott Ph.D., R.N. for her enthusiastic personality and enduring patience with helping me grasp statistics. I am appreciative for the support and cooperation of the emergency department staff and manager who took on extra patient care responsibilities while I performed my data collection.

Finally, I am indebted to my family. Thanks to my parents for their loving support and free daycare as well as my husband and children who generously sacrificed, supported, tolerated, and encouraged this goal.

Table of Contents

List of Tables-----	vii
List of Figures-----	viii
List of Appendices-----	ix
CHAPTER	
1 INTRODUCTION-----	1
2 CONCEPTUAL FRAMEWORK AND LITERATURE	
Conceptual Framework-----	6
Review of Literature-----	14
Subjective Comments-----	14
Pain-----	15
Anxiety-----	16
Physiological Changes-----	18
Musical Choice-----	20
Summary-----	22
Hypotheses-----	23
Definition of Terms-----	23
3 METHODS	
Study Design-----	25
Internal Validity-----	26
External Validity-----	27
Sample and Setting-----	28
Instruments-----	30
Datascopie monitor-----	30
Visual Analogue Scale-----	31
Procedure-----	33
4 DATA ANALYSIS	
Data Analysis-----	38
Dependent Variables-----	39
Pain-----	39

	Anxiety-----	39
	Pulse-----	40
	Blood Pressure-----	41
	Additional Findings of Interest-----	44
	Source of Pain-----	44
	Musical Choice-----	44
	Length of Time-----	45
	Subjective Comments-----	45
	Summary-----	46
5	DISCUSSION AND IMPLICATIONS	
	Discussion Related to Hypotheses-----	47
	Hypothesis 1-----	47
	Hypothesis 2-----	47
	Hypothesis 3-----	48
	Hypothesis 4-----	49
	Relationship of Findings to Conceptual Framework-----	49
	Discussion of Findings Related to Previous Research-----	50
	Pain-----	50
	Anxiety-----	50
	Physiologic Changes-----	51
	Subjective Comments-----	51
	Limitations-----	52
	Implications for Nursing-----	54
	Recommendations for Future Research-----	55
	Summary-----	56
	APPENDICES-----	57
	LIST OF REFERENCES-----	70

List of Tables

Table		Page
1	Characteristics of Nominal Demographic Data-----	29
2	Analysis of Hypothesis 1-----	39
3	Tests of Significance for Hypothesis 2-----	40
4	Analysis of Hypothesis 3-----	41
5	Analysis of Systolic Blood Pressures for Hypothesis 4-----	41
6	Analysis of Diastolic Blood Pressures for Hypothesis 4-----	42
7	Paired t-test for Differences Within Groups-----	43

List of Figures

Figure	Page
1	Diagram of Neuman's Systems Model----- 7

List of Appendices

Appendix		Page
A	Permission to Conduct Research-----	57
B	Script-----	59
C	Consent Forms-----	60
D	Demographic Sheets-----	62
E	Instruments-----	64
F	Business Card Given to Participants-----	68
G	Permission to use Neuman Systems Model Diagram-----	69

CHAPTER I

Introduction

Pain. It is one of the most common subjective symptoms heard by health care providers today. It is not limited by time, economic class, ethnic group, or social status. Pain is the reason most people give for seeking care in the emergency department (ED) (Paris & Stewart, 1992 and Tanabe & Buschman, 1999). The ED is a frightening and threatening place. Pulses quicken and blood pressures rise as the sick and injured seek help. Patients often are exposed to the disease and death of others causing additional physical and emotional distress. Weisenberg (1984) found that high levels of anxiety increase the perceived degree of pain. Evidence also suggests that poorly treated acute pain may exacerbate the underlying pathophysiology of many illnesses and injuries (Paris & Stewart, 1992). As a result, patients who come to the emergency department for reasons of pain often succumb to greater degrees of pain as their anxieties increase in the unfamiliar, fast-paced, and highly technical environment.

Physicians and nurses produce pain with their numerous diagnostic and therapeutic procedures. "Whereas the physicians job is to diagnose the reason for the pain, the nurses role is to assist in the management of a patients pain while the cause of the pain is determined" (Tanabe & Buschman, 1999, p. 171). Too often, nurses can not control their patient's pain and anxiety. This often leaves them feeling frustrated with their abilities.

While guidelines exist to help in the management of pain, many health care professionals continue to lack an understanding of how to deal with pain and anxiety. Numerous studies have shown that narcotics are poorly used in many settings including

medical units, postoperative areas, burn units, and hospice (Paris & Stewart, 1992 and U.S. Department of Health and Human Services, 1994). This is also extremely apparent in the harsh surroundings of the emergency department. Common mistakes in the treatment of acute pain are due to many factors. Poor understanding of basic pharmacological principles as well as irrational and greatly exaggerated fears of creating drug addictions or causing life threatening side effects are just several of the problems identified. In addition, poor assessment of pain and concerns about creating tolerances to analgesics contribute to these misunderstandings (Paris & Stewart, 1992 and U.S. Department of Health and Human Services, 1994).

Despite the sophistication of our age, pain and anxiety continue to be serious problems. People, disappointed with traditional medicine's inadequate management of pain, are turning to nontraditional therapies and they are finding relief. Alternative treatments such as therapeutic touch, acupuncture, aromatherapy, and prayer "have always existed underground rather than as part of mainstream Western medicine" (Mornhinweg, 1995, p. 20). Today these therapies are becoming more accepted by health care providers, especially nurses who are always looking for new ways to help people. The American Medical Association estimated that in the seven years between 1990 and 1997 there was a 50% increase in the number of Americans who sought alternative practitioners (Stapleton, 1998). Stapleton also found that in 1997 consultations with these alternative therapists were more numerous than visits to primary care physicians. People are discovering that alternative therapies can provide a powerful adjunct to medical treatment. One alternative that is continuously gaining popularity is music therapy.

The leader of the German Protestant Reformation, Martin Luther, once said, "My heart, which is so full to overflowing, has often been solaced and refreshed by music when sick and weary" (Cole's Quoteables, 1999). Music's power has been apparent for many years and throughout many cultures. In her 1996 article on managing stress, Karpen reviews the following facts of music's historical birth through the centuries. Plato and Aristotle believed music could profoundly effect the human body. Early Greek physicians used music to cure melancholy. It was not by coincidence that Apollo was the god of both medicine and music and his son was a patron of the healing arts. Pythagoras, more than 2500 years ago, advocated "daily singing and playing of an instrument to cleanse the emotions of worry, sorrow, fear, and anger" (p. 214). Natives of North America held widespread belief in music's power to cure. The above accounts by Karpen suggests music's historical beginnings and highlights only a small portion of the centuries positive association between music and cure.

As societies advanced, modern medicine became allied with science while music became a form of entertainment. Despite science and technology, numerous cultures continue to believe in the healing powers of music. Native civilizations found in North and South America continue to use music as medicine as do Aborigine, Eskimo, and Indonesian tribes. More recently, an increased acceptance of alternative practices has developed in the industrialized nations. Numerous professionals such as dentists, occupational and physical therapists, and psychologists are researching music's benefits during various procedures. The American Institute of Stress proclaimed that music facilitates anesthesia, reduces the stress and discomfort of surgical and dental procedures,

relieves anxiety and depression, and promotes recovery following a heart attack (as cited in Karpen, 1996).

There is growing evidence to support the therapeutic relationship between music and healing. Heiser (1997) found that poor management of pain can contribute to patient dissatisfaction, delayed healing, and prolonged hospitalization. Health care professionals are seeing the value of diversion techniques such as music. Donovan (1982) found that a musical diversion successfully decreased patients' perception of pain and pain-related anxiety. Music also increased patients' satisfaction with the management of their pain. As discussed earlier, heightened levels of anxiety can lead to undesirable reactions to pain. Augustin (1996) studied patients undergoing invasive procedures and found that even minor procedures can produce anxiety and negatively affect postoperative recoveries. Updike (1990) researched the effect of music on patients admitted to intensive care units. She found that patient's moods shifted significantly in the direction of a more desirable state of well-being. In addition, she reported significant reductions in anxiety and a diminished pain experience with the implementation of music. It should be pointed out that Updike reports her findings as significant, however, statistical values were not provided in the article.

The emergency department atmosphere is frequently intense and stressful. Merely entering the ED can often cause feelings of fear, anxiety, uncertainty, and helplessness (Hatler, 1998). Such emotions along with physical responses can heighten perceptions of pain. Though pain relief is often a priority for emergency nurses, analgesics must often be delayed until diagnostic testing has been completed. Diversion techniques are generally necessary to promote relaxation during this seemingly endless period of time. This makes

the ED a prime environment to test the effect of music. The reported benefits of music may be a beneficial adjunct to procedures that produce a great deal of anxiety and pain.

Current theory suggests that music therapy complements scientific treatment by distracting people's attention away from stressful procedures. This in turn decreases pain and anxiety and improves outcomes. Music is a useful adjunct to nursing, a profession that has a long standing history of bringing a holistic perspective to patient care. Nurses continuously witness how the mental and emotional outlook of their patient effects how they feel and in turn, how they heal. Improving that outlook could be as simple as putting on a pair of headphones.

The purpose of this study was to examine the benefits of music therapy on pain and anxiety during the insertion of a peripheral intravenous (IV) device in the emergency department. It is a study based upon research published in Heart and Lung (Jacobson, 1999). A considerable number of admissions to the ED involve invasive procedures, these can include such things as laceration repair, pelvic exams, chest tube insertion, intravenous access, and lumbar punctures among others. Injury and illness cause stress within the body. Anxiety and pain are natural reactions to stress. The uncertainty of admission to the ED and the anticipation of an invasive procedure produces further apprehension. This combination of stressors may cause a person to experience heightened levels of both pain and anxiety. Music therapy could have a positive effect on both of these phenomena and result in a more satisfactory ED experience for the patient. "Satisfaction with emergency care often depends on the immediate outcome and pain relief is the most immediate of patient outcomes" (Paris & Stewart, 1992, p. 201).

Chapter 2

Conceptual Framework and Literature Review

Conceptual Framework

The stress caused by personal injury generates a great deal of pain and anxiety. Treating injuries in the threatening environment of an emergency department adds to this stress and heightens the subjective feelings of both the pain and anxiety. The frequent fast pace and high-tech surroundings often leave a patient feeling stripped of their identity and control. For emergency nurses, dealing with such reactions and feelings can often be an endless and tiring task. Nursing theorist, Betty Neuman (1995), offers a framework for understanding the complexities of a patient's reaction to stress. The Neuman systems model depicts people as interacting with their environment in response to stressors. This makes Betty Neuman's model an ideal framework to guide a study that involves the stress of personal injury and the perceived threat in the ED environment.

The Neuman systems model represents the client's continuous relationship to environmental stress factors (Neuman, 1995). The model is based on the concepts of stress and the reaction to stress. The client is conceptualized as an open, whole system whose parts are in dynamic interaction. Neuman depicts the client system as a series of concentric circles surrounding a basic structure consisting of lines of resistance, and normal and flexible lines of defense (see Figure 1).

There are five variables that simultaneously affect the client system (Neuman, 1995). The variables include: physiological, psychological, sociocultural, developmental, and spiritual. Examples of physiologic needs of a client entering the emergency

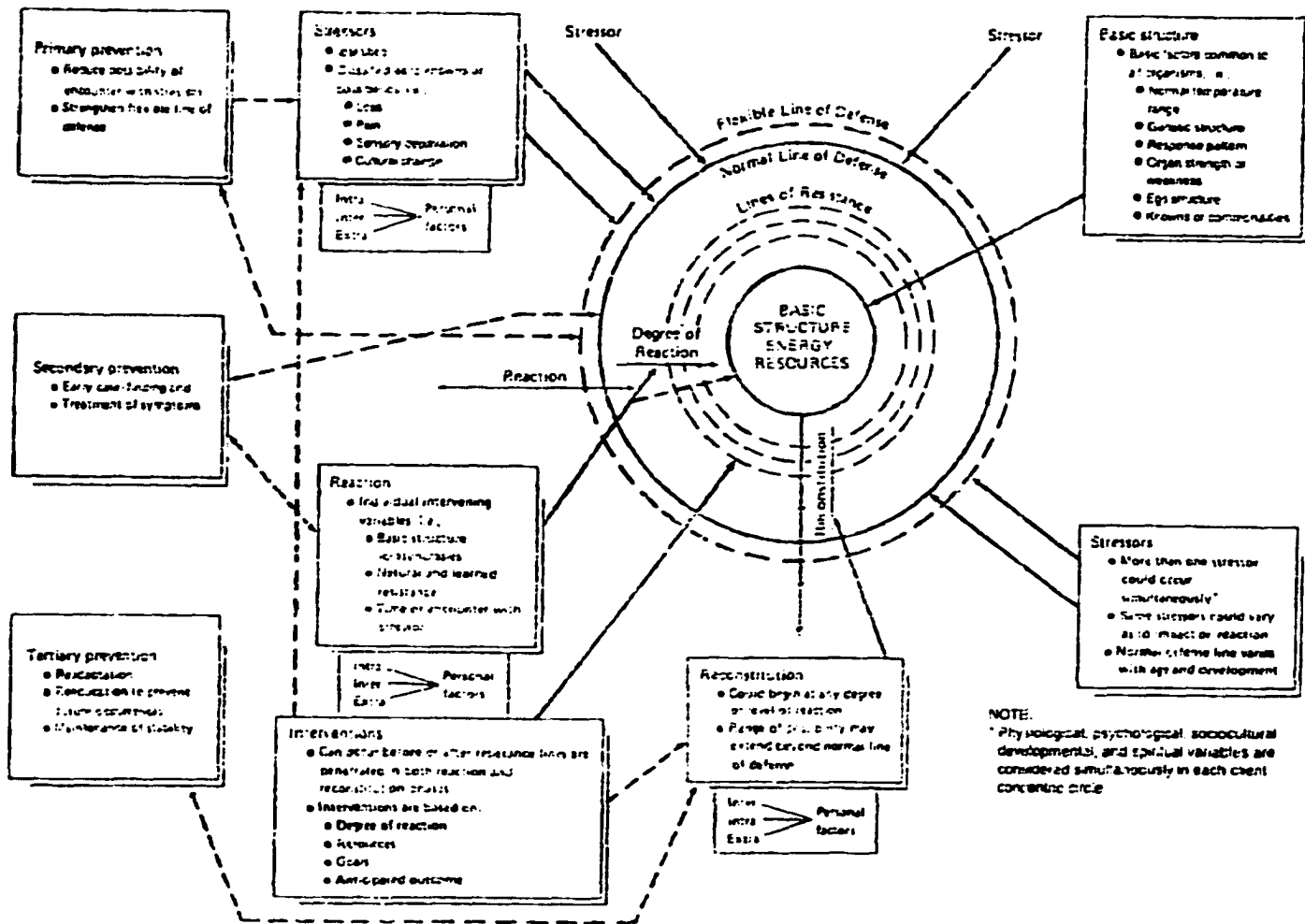


Figure 1. Diagram of the Neuman systems model. From The Neuman Systems Model (p. 17). by Betty Neuman, 1995. Permission obtained on 4/20/00 for reprinting.

department can range from control of discomfort caused from a throat infection to reestablishing cardiac function in a critically injured and dying individual. Psychological variables refer to the client's mental and emotional processes. This process can potentially be altered by injury or illness. Emotions such as fear, anxiety, sadness, and grief are often encountered in the intense environment of the ED. Sociocultural variables involve the relationships the client has developed with family and others. Economic level, lifestyle, and culture are examples of sociocultural variables that can affect health practices. The developmental variable is important to consider when trying to understand the client's abilities to interpret and cope with the current crisis and plan for recovery. Finally, the dimension of spirituality considers religious beliefs and human value which can be affected by injury.

Neuman (1995) also discusses basic survival factors that are common to all organisms. These include normal temperature, genetic structure, response pattern, organ strength or weakness, ego structure, and commonalities. The previously mentioned five variables, together with the basic structure and survival factors are depicted as an inner circle or core and form the center of the Neuman systems model.

Surrounding the basic structure are several lines of defense and resistance (Neuman, 1995). The flexible line of defense, the outermost broken ring, acts as a protective buffer that prevents stressors from breaking through the normal line of defense. The solid, normal line of defense represents the individual's usual state of wellness. Between the basic structure and the normal line of defense are the lines of resistance. These lines contain the resources that help the client defend against a stressor. The lines of resistance protect the basic structure. Activation of these lines occurs when there has

been an invasion of the normal line of defense by environmental stressors. Internal and external resource factors are contained within these lines that protect the system integrity. Ineffectiveness of the lines of resistance can lead to depletion of energy and possible death.

Neuman (1995) defines stressors as environmental forces that may alter system stability. They are disruptive forces that can be intrapersonal, interpersonal, and extrapersonal. As discussed, these stressors are able to penetrate both lines of defense and the lines of resistance. Results of stressor invasion can be either positive or negative depending on the lines of resistance.

Nursing in the Betty Neuman systems model is a unique profession that concerns itself with all the variables that affect an individual's response to stress (Neuman, 1995). The main goal of nursing is to "facilitate optimal wellness for the client through retention, attainment, or maintenance of client system stability" (p. 25). Nursing interventions should "mitigate or reduce stress factors and adverse conditions that affect or could affect optimal client functioning" (p. 16). In addition, nursing should base interventions on a synthesis of comprehensive client data and relevant theory that are appropriate to the client's perception of need.

Health or wellness are viewed on a continuum (Neuman, 1995). Wellness and illness are on opposite ends of this continuum. Health for the client is equated with optimal system stability. Energy flow is continuous between the client system and the environment. Variances from wellness or varying degrees of system instability are caused by stressor invasion of the normal line of defense. The ability of the patient to attain wellness is greatly influenced by their ability to counteract both internal and external

stressors. Nursing attempts to “advance clients along this continuum, ultimately returning them to their maximum state of wellness or achievable functioning” (p. 277).

The point of entry into the health care system for both the client and the caregiver is predominantly at one of three levels: primary, secondary, and tertiary (Neuman, 1995). At the primary level actions are aimed at retaining client stability and reducing encounters with a stressor. Smoking avoidance programs and immunizations are examples of primary techniques that are meant to strengthen the flexible line of defense and retain stability. The tertiary level includes actions that are meant to maintain system stability. Techniques used at this level are designed to prevent additional reactions to stressors or regression from the current level of wellness.

The client entering the emergency department after an illness or injury has occurred presents at the secondary point of entry, that is, after the stressor reaction has taken place. Suspicion or identification of a stressor marks the moment that nursing interventions need to begin. Interventions at the secondary stage must be directed towards wellness attainment. These interventions must deal with existing symptoms and attempt to strengthen the lines of resistance thus protecting the basic structure. Nursing’s goal is to treat the symptoms of the illness or injury so the client regains optimal system stability or wellness and energy conservation.

Applying the Neuman systems model to the client who presents to the emergency department due to illness or injury is easily accomplished once there is a basic understanding of the components of the model. An example of an invasive procedure frequently performed in the ED is peripheral IV insertion. IV insertion is an invasive procedure causing a disruption of the skin which covers and protects the body. The result

of this disruption poses a threat to the flexible lines of defense which protects the client system. The skin or normal line of defense is the body's protective barrier from infection and disease. Inserting an IV represents a disruption and possible threat to this defense. With the normal line of defense penetrated, the client has the potential of developing instability or illness. Lines of resistance go to work preventing further instability and protecting the basic structure. Examples of this protection include the hematologic and immune systems which immediately activate to prevent blood loss and potential infection (McCance, 1998).

Music therapy is an example of holistic care. Neuman's (1995) conceptual framework reminds us to provide holistic care by looking beyond the physiological variable to the other variables presented in the model. Nursing must consider levels of anxiety, fear, economic levels, and lifestyles. Also important to consider are educational achievements, life experiences, and human values. Attention to these details allow nurses to provide the quality of care a client requires and deserves when presenting to an emergency department for treatment. In addition, an awareness of this information also guides the nurse in regards to teaching so that appropriate care can be continued once the client is home. Music is an avenue that allows nurses to intervene with a number of these concerns including anxiety, pain, and possibly fear. Music has the potential to strengthen the lines of resistance and in turn protect the basic structure.

Neuman (1995) broadly defines environment as "all internal and external factors or influences surrounding the identified client or client system" (p. 30). The internal environment consists of "all forces or interactive influences internal or contained solely within the boundaries of the defined client" (p.31). This correlates with the model's

intrapersonal factors or stressors. Poor clotting factors, dehydration, insufficient nutrition, and learned reactions to stress are internal environmental factors that can affect how a client's body will respond to the stress of an IV insertion. The external environment consists "of all forces or interactive influences external to or existing outside the defined client system" (p. 31). This correlates with interpersonal and extrapersonal factors or stressors. Conditions under which an injury occurred and safety issues that threaten the client are examples of external environment. Finally, Neuman discusses the created environment which is developed unconsciously by the client and "represents an open system exchanging energy with both the internal and external environment" (p.31). How the client views the threatening surroundings of the ED as well as past experiences with and reactions to an invasive procedure are examples of the environment created by the client and may lead to additional stress. Using Neuman's theory one can conclude that music may improve the client's ED visit. This in turn will decrease future fears and threats brought on by the created environment and fortify the basic structure.

In summary, every aspect of a person can only be understood by examining the total system. Each system is a consolidation of five variables. Any disruption in the system's usual stability level is considered a stressor. Stressors occur within an individual's internal, external, and created environments. The degree to which the system is disturbed by the stressor depends on the system's circumstances and the defense mechanisms the person has adapted over time. Nurses assist clients in gaining stability. This is accomplished by reducing known or possible internal or external stressors which impinge on the clients ability to maintain stability. Music is a powerful tool to strengthen lines of resistance and help clients move toward greater stability.

For the purpose of this study the concepts of secondary intervention, internal environment, external environment, and lines of resistance will be discussed. As mentioned previously, the internal environment occurs within the boundary of the client. This includes all physiological, learned, and conditioned responses one has developed throughout their lifetime. When an illness or injury occurs, the body's internal responses go to work protecting the basic structure. If the client is healthy both physiologically and psychologically, the chances of complete recovery and energy conservation are greater.

The external environment consists of forces occurring outside the boundaries of the client both at proximal range (interpersonal stressor) and at distal range (extrapersonal stressor). When a person comes to the ED for treatment of their illness or injury these stressors add to the intrapersonal stressors already present. External stressors such as how the ED staff communicate to the client and the atmosphere of the ED can affect how the client will respond to their illness. Likewise, financial concerns of the costly ED visit and issues of healing may also add stress. Kiecolt-Glaser (1995) studied caregivers and found that those who were highly stressed while giving care to their loved ones experienced slower rates of wound healing. It is obvious that such features are important considerations when trying to maintaining system integrity and they are very influential in precipitating increased anxiety and pain. However, due to time constraints and an inability to control for things such as atmosphere and finances, these stressors will not be addressed within the context of this thesis. In order to exert as much control as possible over external stressors such as staff personalities and atmosphere, the researcher interacted with the client one on one while obtaining research data and when performing the venipuncture.

Lines of resistance are activated following invasion of the normal line of defense by environmental stressors. These lines represent what the client has become or evolved into over time. Effective lines of resistance have the ability to reverse the reaction to stressors allowing the system to reconstitute. Ineffective lines of resistance can eventually lead to death (Neuman, 1995). This research attempted to strengthen those lines of resistance and conserve energy through the introduction of music. An awareness of these variables and concepts provide nursing with the ability to deliver holistic, quality care to a client that presents to the ED requiring an invasive procedure and experiencing the pain and anxiety that accompanies such illness or injury.

Review of Literature

In recent years a great deal of research has been accomplished in the area of music therapy. Numerous studies have found a positive correlation between the use of music and its ability to help in easing pain and anxiety (Menegazzi, Paris, Kersteen, Flynn, & Trautman, 1991; Mullooly, Levin & Feldman, 1988; Pfaff, Smith, & Gowan, 1989; and Updike, 1990). Research has also shown that the nursing profession may be “awakening to the role of the nurse in the judicious integration of music into total, individualized patient care” (as cited by Cook, 1981, p. 261). Music is a diversional activity which helps to refocus the patient’s experience of pain and anxiety into something more pleasant. Music is one tool to assist nurses in strengthening their clients’ lines of resistance.

Subjective Comments. Numerous subjects have reported the value of music in decreasing their pain, anxiety, or a combination. Menegazzi, et al. (1991) studied music’s effect on pain during laceration repair in the ED. One hundred percent of the patients involved in the study said they would use music in the future. Likewise, music therapy has

been instituted in the ED to help relieve the pain and anxiety experienced by pediatric patients undergoing invasive procedures (Berlin, 1998). Berlin found a difference between pediatric patients who listen to music and those who do not. Staff members reported a reduction in behaviors consistent with pain and anxiety when music was utilized in the ED setting. Positive findings were reported by Locsin (1981) as one hundred percent of the subjects said they would use music during their post-operative period again. Updike (1990) studied pain in the intensive care unit (ICU). She found that two-thirds of the patients experienced physical and/or emotional pain before music therapy. After the music therapy, the patients reported diminished, more manageable, or absence of pain. Heiser, Chiles, Fudge, and Gray (1997) studied patients who were emerging and recovering from anesthesia. The subjects reported feeling more relaxed and distracted with the music. Though the sample size was only nineteen, one-hundred percent said they would use music for future surgical procedures and felt it was beneficial during surgery. Studies conducted over several days (Locsin, 1981 and Mullooly, Levin, & Feldman, 1988) demonstrated a decreased pain experience on the second day.

Pain. Several studies have demonstrated music's positive effect on pain management. Magill-Levreault (1993) found that "music may alter components of the total pain experience and thus diminish the perception of pain" (p. 43). Evidence to support music's therapeutic role in pain reduction is offered in a variety of studies (Dubois, Bartter, & Pratter, 1995; Locsin, 1981; Menegazzi, Paris, Kersteen, Flynn, & Trautman, 1991; Pfaff, Smith, & Gowan, 1989; Schorr, 1993; and Updike, 1990). These researchers demonstrated a decrease in the perception of pain after music therapy was instituted.

Some researchers reported that the intensity of pain considerably determined if the musical intervention would be effective. Marchette, Main, and Redick (1989) observed music's effects during the intense pain of cutting and clamping during the neonatal circumcision. They found no beneficial use of playing taped recordings of music nor recordings of intrauterine sounds during the procedure. However, neonates were more relaxed during other less painful steps of the procedure when music was provided. In contrast, Davis (1992) found music was not statistically helpful during office gynecological procedures and felt it would have been more effective with severe pain experiences such as punch biopsy or colposcopy. Music's effect on the pain experienced during IV access has been found to be ineffective in relieving discomfort in several studies. Jacobson (1999) researched pain's intensity and distress during intravenous catheter insertion on adults in the hospital setting. She found no statistical difference between the music group and the control group. Arts, Abu-Saad, Champion, Crawford, Fisher, Juniper, and Ziegler (1994) produced similar findings when they studied children, ages four to sixteen, requiring IV access for surgery. The researchers found "no discernible benefit from music distraction" (p. 800). They attributed their findings to the lack of cognitive development of the younger children who may have been unable to understand the Faces Pain Scale or the visual analogue toy.

Anxiety. Multiple studies have reported the benefits of music in decreasing anxiety (Eisenman & Cohen, 1995; Guzzetta, 1989; Menegazzi, Paris, Kersteen, Flynn, & Trautman, 1991; Mullooly, Levin, & Feldman, 1988; Palakanis, DeNobile, Sweeney, & Blankenship, 1994; Pfaff, Smith, & Gowan, 1989; Updike, 1990; and White, 1992). Although these benefits were not statistically significant, numerous subjects praised the

results. Research conducted in stressful environments such as the ED and critical or intensive care units have shown beneficial results in managing anxiety. Menegazzi et al. used music to ease the anxiety that people experienced in the hectic environment of the ED. In a study by Guzzetta, critical care patients with the presumptive diagnosis of acute myocardial infarction received music and relaxation therapy. The majority of the subjects reported they learned to relax with the music, thought it would be helpful to future patients, and planned to continue the practice during their recovery. Similarly, White's findings from a study of intensive/coronary care patients with the confirmed diagnosis of myocardial infarction demonstrated that patients who received music therapy had lower state anxiety scores. Updike's study of critical care patients found that music therapy resulted in improved mood, reduced anxiety and depression, and an overall diminished pain response. In contrast, Branason (1995) found music offered no significant difference initially but found that anxiety was reduced over time. Branason's study was conducted in the critical care unit (CCU) with ninety-six patients who had underwent elective heart bypass surgery.

Other music therapy research has been unable to demonstrate improvement in anxiety through verbal report or statistical measurements (Augustin & Hains, 1996; Gaberson, 1995; Good, 1995; and Heiser, Chiles, Fudge, & Gray, 1997). The patients in these studies found that music offered no difference in the anxiety level one experiences when preparing to undergo surgery. Control group subjects in the Augustin and Hains' study who received only preoperative teaching demonstrated a decrease in anxiety that was comparable to the experimental group. Rasco (1992) studied nine children between the ages of four and twelve undergoing lumbar punctures. The children served as both the

experimental and control group. Although the statistics were not reported, Rasco noted significantly higher Oucher ratings during the music intervention than during the baseline lumbar puncture. Rasco attributed the findings to the possibility that the music caused an inappropriate distraction. In addition, they felt that the headphones did not allow the children to hear the progress of the procedure or the comforting words from parents and staff, therefore, increasing the stress of the puncture.

Physiologic Changes. Physiologic changes are often monitored with a musical intervention as a means of supporting data. Watkins (1997) describes two main central nervous system components that are involved in the stress response. The first component is the endocrine response which is responsible for releasing various hormones that in turn effect cortisol levels. The second element is the autonomic nervous system. This system stimulates the release of epinephrine. It is cortisol and epinephrine that are responsible for increasing anxiety, heart rate, and blood pressure. Music effects on the central nervous system may be through inhibiting the effects of cortisol and epinephrine.

Studies have supported improved physiologic responses with music. Guzzetta (1989) reported a significant decrease in heart rate ($F= 48.56, p < 0.001$) and increased peripheral skin temperature ($F= 42.61, p < 0.001$) with patients in the CCU. White's (1992) study of post myocardial infarction patients in the CCU demonstrated reduced heart rates and decreased respiratory rates. Updike (1990) also decreased blood pressures in the CCU through the use of music. Music helped Augustin and Hains (1996) significantly lower heart rates ($t = -3.30, p < 0.005$), diastolic blood pressures ($t = -3.20, p < 0.005$) and respiratory rates ($t = -6.40, p < 0.0005$) in a group of ambulatory surgery patients.

Certain procedures proved to be better tolerated when music was offered. Blood pressure, pulse, and respiratory rates lowered with the use of music during laceration repair in the ED (Menegazzi et al., 1991). Pulse and mean arterial pressure decreased during flexible sigmoidoscopies (Palakanis et al., 1994). Davis' (1992) study of women undergoing office gynecological procedures documented a slight decrease in pulse and respiratory rate but the data was not significant. Marchette et al. (1989) found that although music did not help pain during the most severe steps of neonatal circumcision, blood pressure and pulse were within the normal range more frequently with the music group than with the control group. Additionally, Dubois et al. (1995) and Locsin (1981) demonstrated a minute improvement in the blood pressure, pulse, and oxygen saturation of subjects undergoing bronchoscopy and during postoperative recovery, respectively. Augustin and Hains (1996) used music prior to surgery and demonstrated lowered pulse, respiratory rates, and diastolic blood pressures during this preoperative phase. Likewise, Heiser (1997) studied vital signs throughout surgery and in the recovery room but did not comment on the findings.

A final analysis of physiologic effects of music involved surgeons and nursing students. Allen and Blascovich (1994) studied surgeons who routinely listened to music while operating. They performed various tasks while listening to three different types of music. The researchers found that blood pressure and pulse were lower with music selected by the surgeons. Mornhinweg (1992) demonstrated a decrease in pulse when nursing students listened to unfamiliar relaxing music despite the fact that this type of music was not the students favorite. Physiologic changes are important factors to

consider when deciding if music therapy is an effective intervention in relieving anxiety and pain.

Musical Choice. An important decision to make when using music as an intervention for pain or anxiety is whether or not to offer a choice of music. Music is “an orderly arrangement of sound consisting of melody, harmony, rhythm, tone, and pitch” (Watkins, 1997, p. 44). It has a personal and intimate meaning for each individual and can have either a calming or stimulating effect. Research at Penn State University has found that “the most relaxing music you can listen to is the music you like best” (as cited in Butcher, 1995, p. 4). Cook (1981) quotes similar findings from a 1969 study by Farnsworth citing “most research shows the effects to be greater the more the music has meaning for the listener” (p. 259). O’Callaghan (1996) agrees that “patients should be invited to choose the music that they wish to listen to” (p.45).

Other sources feel that choosing physiologically correct music is critical in managing a patient’s pain and anxiety. Johnston and Davis (1996) encourage those who are starting a music therapy program to consider the tempo, volume, and tone of the music. Tempo, Johnston and Davis states, is the major cause of physiologic response to music. When music has a tempo of 70 to 80 beats per minute it approximates the heart rate and is considered more soothing. Whereas faster beats may create tension. Pitch can create tension if it is too high and relaxation if it is too low. Therefore, many music therapists feel that in order to reduce anxiety, music should have a slow steady rhythm, low-frequency tones, orchestral effects, and relaxing melodies.

McCraty, Barios-Choplin, Atkinson, and Tomasino (1998) studied the moods, tension and mental clarity of healthy church goers when they listened to four different

types of music. McCraty et al. found that tension increased, mood decreased and mental clarity was less when subjects listened to grunge rock while just the opposite was true when the subjects listened to designer music. Designer music is a term given to music that was introduced by the music industry. It is geared toward producing an effect on a listener's physiological and psychological status. Mornhinweg (1992) studied undergraduate nursing students and found that even though popular music was preferred by the students, it was the unfamiliar Baroque and classical music that caused the greatest relaxation. Allen and Blascovich (1994) studied male surgeons who were accustomed to listening to music while they did surgery. The surgeons performed various tasks in silence and repeated the tasks while listening to self-selected and investigator selected music. As long as the music was the surgeon's own choice, it was associated with favorable physiological responses and task performance.

Research results vary when musical preference is permitted. Regardless of the study variable, when investigators allowed their subjects to choose their favorite music they were able to document an improvement in pain or anxiety (Eisenman & Cohen, 1995; Locsin, 1981; Menegazzi, Paris, Kersteen, Flynn, & Trautman, 1991; Palakanis, DeNobile, Sweeney, & Blankenship, 1994; Pfaff, Smith, & Gowan, 1989; Schorr, 1993; and Updike, 1990). However, other researchers who allowed musical choice were unable to demonstrate a statistical improvement in the degree of pain or anxiety experienced (Davis, 1992 and Jacobson, 1999).

Barnason (1995), Good (1995), and Heiser, Chiles, Fudge, and Gray (1997) offered limited styles of music from which to choose. Their subjects reported no improvement in pain or anxiety with the music. Arts, Abu-Saad, Champion, Crawford,

Fisher, Juniper, and Ziegler (1994), Gaberson (1995), and Marchette, Main, and Redick (1989) offered only tranquil forms of music, the music that some feel is necessary to mimic the bodies physiological processes. However, these researchers were unable to support an improvement in anxiety. As the findings demonstrate, results vary widely regardless of who is choosing the music.

Summary

Music has been utilized in a variety of settings and environments to decrease a patient's level of pain and anxiety during various procedures and tasks. An intervention such as music therapy is an important tool that can assist the patient in building lines of resistance. Although it is an art that has been around for centuries, these studies indicate that music is just beginning to emerge as a valuable tool in clinical health care.

A number of research studies have been discussed, however, the results remain inconclusive and diverse. Often they report very little statistical significance and a large majority involve small sample sizes. A greater variety of patient populations must be considered as the majority of research has been done in the surgical area or intensive care units. Consistencies in the literature have been reviewed but more research is needed to support the positive findings. Additionally, a look at various cultures and their application of music in the healing process deserves attention. Few studies question the element of time and how long one should listen to music before a decrease in pain and anxiety is experienced.

This research attempted to limit some of the gaps in the literature by studying music's effects during IV insertion, an invasive, and potentially painful and anxiety provoking experience. In the emergency department, where the pace is fast and the

atmosphere intense, nurses are continuously looking for ways to calm and ease their patient's fears. Allowing a patient to select music of their liking may give them the sense of having some degree of control. Applying a pair of headphones may muffle the anxiety producing sounds occurring around them. This inexpensive yet valuable intervention can aide the patient in reinforcing their lines of resistance.

Hypotheses

The following hypotheses were investigated:

1. Patients who listen to music will report a decrease in pain during IV insertion as compared to the non-music group.
2. Patients who listen to music will report a decrease in anxiety during IV insertion as compared to the non-music group.
3. Patients who listen to music will experience a decrease in heart rate after IV insertion as compared to the non-music group.
4. Patients who listen to music will experience a decrease in blood pressure after IV insertion as compared to the non-music group.

Definition of Terms

Pain: A complex and abstract phenomenon that entails many different stimuli and responses. Pain, as measured on the visual analogue scale, is "whatever the experiencing person says it is existing whenever he says it does (as cited in Mullooly, 1988, p.4).

Anxiety: Feelings of apprehension, tension, nervousness, or worry in anticipation of IV insertion as measured by scores on the visual analogue scale.

Music: A distraction stimulus that, when given a preference of style, refocuses ones attention to something which is pleasant and occupies the mind with something familiar and soothing (Siegele, 1974).

Blood Pressure: The pressure of the blood within the arteries as measured by the automatic Datascope monitor.

Heart Rate: The number of contractions of the cardiac ventricles per minute as measured by the automatic Datascope monitor.

Chapter 3

Methods

Study Design

A pretest-posttest control group quasi-experimental design was chosen for this study. This type of design offers a more accurate comparison of the dependent variables of pain, anxiety, blood pressure, and heart rate against a control group. An experimental design is the most powerful tool available to measure cause and effect relationships between groups. The experimental design supports a greater degree of confidence which is necessary for the implementation of research into nursing.

Randomization of subjects allows for greater control and confidence in the experimental design as does the use of a control group which allows for comparison of the cause and effect relationship. A control group was used for comparison. Due to time constraints randomization did not occur and a convenience sample was used.

Several limitations exist with the pretest-posttest experimental design. Patients presenting to the emergency department are often rushed. They may not be willing to take the time to fill out a brief questionnaire, complete tools of measurement, or have their vital signs repeated. An additional concern is the Hawthorne effect. Pain and anxiety measurements could change once the patient is aware that they are participating in research. They may tend to suppress their true feelings for fear of embarrassment or ridicule. Despite these limitations, the experimental design is clearly superior in its ability to offer a high degree of confidence and support nursing interventions. Solutions for these limitations will be addressed later in this chapter.

Internal Validity. Experimental research possess a high degree of internal validity due to the control that is exerted. Regardless, threats to the internal validity of an experimental design must be considered. The environment of the ED can cause threats to the internal validity of the experiment. The seemingly detached sense of caring one may perceive in the fast paced environment can increase the anxiety one is experiencing. By following a standard protocol which included data collection by only one researcher, internal validity was strengthened.

External events that lead the patient to the ED can effect results. For example, a subject who comes to the ED requiring IV insertion may have other injuries that must be considered. Providing a visual analogue scale (VAS) prior to IV insertion took into account any pain or anxiety one was already experiencing from other sources. A comparison of post insertion VAS ratings for pain and anxiety decreased the threat to internal validity.

An additional threat that may have been difficult to control was the nurse's skill in performing the procedure. The caregiver's technique and manner in which they approach a procedure can greatly effect the outcome for the patient. For this reason, all IV insertions were performed by the researcher.

With this particular study it was impossible to blind the subjects. It would have been very apparent whether or not a subject received the intervention due to the use of music and headphones with the experimental group. Separate consent forms were administered to the two groups so that a bias was not formed by a person in the control group who was not offered music therapy. The close proximity of the treatment rooms in the ED could have posed a threat as a person in one room could be receiving music while

the person next to them, separated only by a curtain, would not be receiving music. To decrease this threat, the control portion of the study occurred first. After 20 subjects were admitted to the control group, the experimental portion took place using music with the next 21 participants. In this manner, subjects were not biased nor threatened the internal validity of the study.

A lack of understanding of how to use the visual analogue scale was considered as a potential threat to the validity of the research. This was addressed by offering a thorough explanation of how to use the tool prior to its implementation and answering any questions the subject may have had. A final threat to the validity of the research was the inaccuracy of blood pressure and pulse readings. With the use of the same model of blood pressure device and one researcher recording the findings, this threat was diminished.

External Validity. Several threats to external validity exist. The Hawthorne effect, which has been previously discussed, could have prevented generalization of the research findings to a natural setting. A novelty effect could threaten research findings. People may not be enthusiastic about music as a way to relax. They may consider it impractical or a waste of time. Others may be overjoyed with music and rate their pain and anxiety differently because of that. It is difficult to control for such personal preferences. A space for comments was included on the demographic sheet in order to allow the researcher to document any pertinent comments in this regard.

Experimenter effects were considered when deciding on ways to intervene in pain and anxiety. Personalities play a great role in increasing or decreasing anxiety. An experimenters calming and soothing personality, or lack thereof, could greatly influence

how a subject will respond to the pain and anxiety they are experiencing. This threat was decreased by having one person perform the research.

Sample and Setting

The study took place in an emergency department in the rural Midwest. The hospital is a 90 bed member of a not for profit organization. The ED treats approximately 17,000-18,000 patients per year. It is an eight bed department. Six of the eight beds are in one open area with curtains dividing the beds. The arrangement is perfect for patient monitoring by the nurses but does not allow for a great deal of privacy. This department is the only facility in a 40 mile radius and serves a five county area.

The sample of patients for this study included anyone who presented to the emergency department and required a peripheral intravenous insertion. Several criteria had to be met before a potential subject could be included in the study. The subjects had to be 18 years of age or older. They were required to understand, read, and speak English as well as sign an informed consent. In addition, it was essential that the subjects could hear and understand instructions as well as music. They had to be free of alcohol and drugs prior to the procedure. This included any sedating medications given in the ED prior to IV insertion. Finally, subjects were not considered if they had an acute or life threatening condition that required an IV within 15 minutes.

A convenience sample was used for this study. Forty-one subjects agreed to participate and met the inclusion criteria. Descriptive data were collected from the 41 individuals. Ages ranged from 18 to 84 years with a mean of 51.8 years and a standard deviation (SD) of 18.82. The mean age of the control group was 56.8 years with a SD of 16.5. The mean age of the intervention group was 47.0 years with a SD of 20.0.

Participants were asked about their highest level of education in years. In the control group, education levels ranged from 6 years to 19 years with a mean of 11.9 and a SD of 2.62. Education levels in the intervention group ranged from nine to 17 years with a mean of 14.5 and a SD of 1.82. Eighteen men (43.9%) and 23 women (56.1%) participated in this study. A breakdown of gender specific to the control and intervention groups can be found in Table 1.

Table 1

Characteristics of Nominal Demographic Data

Group	Gender		Anxious Person		IV in past		Patient in ED before		Pain tolerance		
	male	female	yes	no	yes	no	yes	no	low	med	high
Control	9	11	5	15	19	1	18	2	3	11	6
Intervention	9	12	7	14	19	2	18	3	2	14	5

A fear of the unknown can often lead to increased anxiety and, as discussed earlier, an increase in anxiety can intensify pain. For this reason, subjects were asked if they had ever received an IV before and if they had ever been a patient in the ED before (see Table 1).

To get an understanding of peoples normal level of anxiety and tolerance for pain they were asked the following two questions: Do you consider yourself an anxious person and how would you describe your pain tolerance. Choices were yes or no and low, medium, and high, respectively (see Table 1).

Instruments

The instruments planned for this research consisted of blood pressure and pulse measurements taken with the Datascope monitor as well as the visual analogue scale, which measured pain and anxiety.

Datascope Monitor. Monitoring the physiologic parameters of blood pressure and pulse is one of the ways in which to measure the degree of pain and anxiety the subject is experiencing. A major physiological effect of the stress response, the response to pain and anxiety, is increased secretion of epinephrine as well as an increase in circulating cortisol levels (McCance, 1998). In turn, these increased levels elevate the blood pressure and pulse. Physiologic measurements have the advantage of precision and sensitivity as patients are unlikely to distort measurements of physiologic functioning. Since blood pressure and heart rate measurements are easily obtained, inexpensive, and reliable, these measurements were used as an adjunct in determining the degree of pain and anxiety one was experiencing.

Recordings were taken pre-procedure and five minutes post-procedure. All blood pressures were obtained using an automatic Datascope monitor. All heart rates were recorded simultaneously with the same device. Both measurements were recorded by the researcher to ensure reliability.

The Datascope non-invasive blood pressure monitor is a product of the Datascope corporation. The module uses an oscillometric technique to determine blood pressure and pulse. A limb cuff is inflated to a predetermined pressure. Software analyzes the pattern of pulsation amplitudes as the cuff deflates and determines the systolic, diastolic and mean pressures as well as the pulse. Nigroni, Lam, & McLaughlin (1989) compared the

reliability and validity of the monitor to a mercury manometer. Agreement was found with correlation coefficients of $r = 0.979$ for systolic and $r = 0.3955$ for diastolic readings.

Visual Analogue Scale. The visual analogue scale is a self-report device used to summarize subjective experiences. M. Freyd first described the VAS in 1923 in the *Journal of Educational Psychology* (as cited in Wewers & Lowe, 1990). VAS use in nursing research is more recently evident with its application mostly used for pain and mood research (Wewers & Lowe).

The VAS is a straight line with end anchors which are labeled as the extreme boundaries of the subjective response being measured. For this study, the anchors on the VAS for pain were “no pain” and “pain as bad as it could be”. The anchors on the VAS for anxiety were “not anxious” and “as anxious as I could be”. Subjects responded to the VAS by drawing a mark through the line at the position that best represented their current sensation or feeling.

Most commonly, the line is 100 millimeters (mm) and is drawn horizontally or vertically. Research has shown conflicting data as to whether the horizontal or vertical axis gives the better results (Cline, Herman, Shaw, & Morton, 1992; Gift, 1989; and Wewers & Lowe, 1990). For this study the vertical line was used as research supports that it is more sensitive, easier to understand and easier to use. For example, as pain increases one can more easily relate this to going up a scale. Thus, with the vertical scale, the subjects mark goes higher up on the line as the pain increases. The intensity of the sensation being measured, pain and anxiety in this case, were scored by measuring the millimeters from the low end of the scale to the subject’s mark. A score can range from 0

to 100 mm. No gradations were placed along the line as doing so reduces sensitivity (Gift, 1989 and Vogelsang, 1988).

Advantages of the VAS include ease of use, it can be seen easily, and it requires minimal dexterity to complete. An additional advantage is that it allows for rapid assessment of a person's subjective feelings. This is an important consideration in view of the episodic care that is provided in the ED.

Despite its strengths, several disadvantages result from the use of the VAS. Some people have difficulty converting "a subjective sensation to a straight line" (Gift, 1989, p. 286). The VAS used in this study contained detailed instructions which were printed at the top of the scale in order to combat this problem. Gift also notes that researchers question the need to show subjects their previous markings for comparison when repeated measures are performed. The subjects in this study were not allowed to see their previous marks when they repeated their measure. Researcher's beliefs differ greatly in regards to the accuracy of photocopying the scale (Cline et al., 1992 and Gift, 1989). To ensure complete accuracy, each VAS scale was printed on a Hewlett Packard Deskjet printer. A final disadvantage of the VAS is scorer's error. To maintain validity and reliability the following recommendations from Cline et al. were used. A template was created which contained the 100 mm marks. This was positioned over the subject's VAS. The template was aligned using structural and visual references. A box that framed the VAS line served as the first reference while the perpendicular anchors served as the second reference point. With these reference points, error was virtually eliminated.

"For the most part, investigators have deemed the VAS to be a reliable and valid measurement tool" (Wewers & Lowe, 1990, p. 230). Reliability of the VAS for assessing

subjective states has been evaluated by a variety of methods. Correlation scores ranging between 0.95 and 0.99 have been reported using repeated measures with various types of pain (Wewers & Lowe and Vogelsang, 1988). Vogelsang's study of anxiety was positively correlated, $r = 0.84$, with scores obtained from the State Anxiety Inventory.

The validity of the VAS has been established with a variety of techniques. Wewers and Lowe (1990) report that the VAS was more sensitive to fine changes in pain as compared to both numerical and four-point rating scales. Correlations between the VAS and various instruments were reported to range from 0.42 to 0.91. Lowest correlation's were seen when comparing the VAS with the McGill Pain Questionnaire, simple descriptive scales, and fixed point scales. Highest correlation's were demonstrated against the numerical rating scale.

Procedure

Approval for the study was obtained from the Human Research Review Committee at Grand Valley State University (Appendix A). The institution in which the study was performed did not have a review board. Approval, therefore, was sought from the nursing and medical directors of the emergency department (Appendix A).

All patients presenting to the ED were evaluated by an ED physician. For purposes of this study, if the physician determined that the patient needed IV therapy for continued treatment, the patient was considered for participation in the study. The patient was matched against the inclusion criteria previously mentioned. They were informed of the research and asked if they would be willing to participate. The first 20 subjects who chose to participate were assigned to the control group. Once verbal consent had been obtained the researcher read from a script (Appendix B). The script detailed the purpose

of the study, the exact procedure, what could be expected, and the length of time involved. It was emphasized that the risk to subjects was minimal and no more than would be found in daily living. Subjects were also informed that if for any reason they removed the headphones before post IV insertion data had been collected, they would be eliminated from the study.

The subject signed a written consent form specific to the control group (Appendix C). The consent form did not contain any information regarding music therapy so that biases were not formed. Blood pressure and heart rate measurements were obtained using the Datascope non-invasive blood pressure monitor. The same model of Datascope monitor was used throughout the study, however, different monitors may have been used depending on which room the patient was in at that time. This initial blood pressure and heart rate was recorded by the researcher in the space provided on page two of the demographic sheet (Appendix D).

Following collection of physiologic data, the researcher gave detailed instruction on how to complete the VAS for both pain and anxiety. Subjects were asked to take into account any and all pain and anxiety they were experiencing at that moment. The subject was asked to place a mark on both scales (Appendix E). Once the blood pressure, pulse, and pre-procedure VAS's had been completed and collected the subject was asked to complete the demographic data (Appendix D) while the researcher prepared the necessary equipment for IV insertion. Due to time constraints in the ED, the demographic data and instruments were selected based on the assumption that they would not delay treatment nor discharge yet provide the most information.

After five minutes the researcher returned and prepared for IV insertion. To control interval validity, only the researcher, with 15 years of experience in IV insertion, performed the venipunctures. The following technique was used for each person. The procedure was explained to the patient and questions were answered. A tourniquet was applied to the arm and the best vein for cannulation was identified. While wearing gloves, the researcher applied betadine solution (except in the case of patient allergy at which time alcohol was used). The solution was allowed to dry on the arm. The IV was then inserted and capped off or connected to an IV solution that had been ordered by the physician. Patients who present to the ED often need an access site for medications. It is not always necessary to provide fluid resuscitation. For this reason, some IV's are capped off. After insertion, the IV was secured with tape.

Five minutes after successful insertion of the IV, the subject was asked to complete the post-procedure VAS's for pain and anxiety (Appendix E). Again, the subjects were asked to take into account any and all pain and anxiety including that experienced from the IV insertion. Blood pressure and pulse were again obtained and documented on page two of the demographic sheet. Space was also allotted on page two for pertinent comments as well as the number of attempts required for successful IV insertion (Appendix D).

The researcher collected all the data and confirmed that the same identification number was on all the information. All forms contained the subjects two digit identification number written at the top right corner of each page to ensure accuracy. A business card was given to the participant (Appendix F). The card thanked them for their participation in nursing research. It also contained the researchers name and phone number as well as the name and number of the contact person on the human research

review committee at Grand Valley State University. The pen that the subject used for completing their information had an inscription that read, "Thank You for supporting nursing research". As a display of appreciation for their time and effort, the pen was offered to the subject at the completion of the study.

Once 20 subjects had been placed into the control group, the experimental portion of the study began. The procedure remained the same with the exception of musical intervention. Subjects in this group received an explanation of the benefits and minimal risk that music can offer during IV insertion. Once written consent for music intervention (Appendix C) had been obtained and completion of the VAS's, blood pressure, and pulse were recorded, the subject was asked to choose a compact disk containing music of their liking. A wide range of musical selections were available including rock, designer, country, jazz, and classical. Three selections were offered from each category. A portable compact disk player with headphones was supplied in order to listen to the music. The subject was instructed on how to use the player and headphones. After their questions had been answered they were asked to apply the headphones and begin to listen to their musical selection. While they listened to the music, the participants completed the demographic sheet. The subject was informed that the researcher would return in five minutes to start the IV. If they became thoroughly engrossed in the music they were informed that their name would be called. If they did not hear their name the researcher would gently touch their arm. Informing the subjects ahead of time controlled the amount of anxiety they may have experienced from being startled by the researchers return.

While the subject listened to music and completed the demographic sheet, the researcher prepared the equipment for IV insertion. After approximately five minutes of listening to the music, the researcher returned for the procedure. Preparation and insertion of the IV remained the same as described for the control group.

The subjects continued to listen to the music. Approximately five minutes after successful insertion of the IV the subject was asked to complete the post-procedure VAS's. Their blood pressure and heart rate were recorded on the demographic sheet. In addition, space was provided on page two of the demographic sheet in which to record specific times including the start of the music, at the moment of IV insertion, and again when the data collection was complete (Appendix D). Those who wished to continue listening to music while in the department were allowed to do so. This request along with any pertinent comments were noted in the spaced provided on the demographic sheet. Subjects in the experimental group also received the business card and thank you pen at the completion of the study.

Chapter 4

Data Analysis

The purpose of this study was to examine the effects of music on pain and anxiety during IV insertion in the ED. The dependent variables included pain, anxiety, blood pressure, and pulse. Pain and anxiety were measured separately using visual analogue scales that were administered prior to IV insertion and approximately five minutes after insertion. Blood pressure and pulse were obtained before and after IV insertion with a Datascope monitor. The independent variable was the use of music. The first 20 participants were assigned to the control group. They did not receive music during IV insertion. The next 21 participants were placed in the intervention group and received music during the IV insertion.

The following hypotheses were investigated:

1. Patients who listen to music will report a decrease in pain during IV insertion as compared to the non-music group.
2. Patients who listen to music will report a decrease in anxiety during IV insertion as compared to the non-music group.
3. Patients who listen to music will experience a decrease in heart rate after IV insertion as compared to the non-music group.
4. Patients who listen to music will experience a decrease in blood pressure after IV insertion as compared to the non-music group.

Data were analyzed using the Statistical Package for Social Sciences (SPSS/Windows) software. A level of significance was established at $p < 0.05$.

The nature of this quasi-experimental study design was one of test and re-test. In order to control for pretest variables and confidently say that the musical intervention made a difference in post-test scores, an analysis of covariance (ANCOVA) was used. ANCOVA controls for pretest measures by taking the covariate, or pre-test scores of the specific variable, and statistically adjusting the scores. This allows one to accurately describe the reason for differences in post-test scores. Five ANCOVA's were run for the four hypotheses. Blood pressure was divided into systolic and diastolic requiring two ANCOVA's for the one hypothesis.

Dependent Variables

Pain. No statistical significance was found when comparing the groups. Results of the ANCOVA, with the covariate being pre-procedure pain scores, demonstrated no statistically significant difference between the control and intervention groups with post-procedure pain scores $F(1, 37) = 0.93$ and $p = 0.34$ (see Table 2).

Table 2

Analysis of Hypothesis 1

Group	Pre-Procedure			Post-Procedure		
	Range	Mean	SD	Range	Mean	SD
Control	0-95	39.3	32.0	0-94	40.5	31.9
Intervention	0-100	53.0	29.7	0-94	48.5	30.8

Anxiety. Music proved effective when comparing the control and intervention groups anxiety level. The ANCOVA demonstrated a statistically significant difference between the groups post-procedure anxiety levels $F(1,37) = 10.39$ and $p = 0.003$. Table 3

analyzes the tests of significance for the post-procedure. Pre-IV insertion scores ranged from 0-95 with a mean of 44.5 and a SD of 34.2. Pre-insertion scores ranged from 0-100 with a mean of 44.5 and a SD of 30.2 for the intervention group. Post-IV insertion scores ranged from 0-92 (M = 38.6; SD = 32.1 and 0-100 (M = 38.1; SD = 31.0) for the control and intervention groups, respectively.

Table 3

Tests of Significance for Hypothesis 2

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	<i>F</i>	<i>p</i>
Within + Residual	20363.18	37	550.36		
Covariate	14293.77	1	14293.77	25.97	.000
Group	3947.64	1	3947.64	7.17	.011
Group by Covariate	5718.95	1	5718.95	10.39	.003
Model	18447.31	3	6149.10	11.17	.000
Total	38810.49	40	970.26		

Pulse. Significant changes in pulse rate were not demonstrated post-IV insertion between the two groups [$F(1, 37) = 0.02; p = 0.884$ (see Table 4)].

Table 4

Analysis of Hypothesis 3

Group	Pre-Procedure			Post-Procedure		
	Range	Mean	SD	Range	Mean	SD
Control	54-121	81.6	18.5	47-120	77.0	18.1
Intervention	58-122	79.5	14.4	54-116	78.0	13.5

Blood Pressure. Two ANCOVA were run to check for significant changes between systolic and diastolic blood pressure post-procedure. There were no statistically significant changes found [$F(1, 37) = 0.29; p = 0.593$ and $F(1, 37) = 0.06; p = 0.813$] for systolic and diastolic pressures, respectively (see Tables 5 and 6).

Table 5

Analysis of Systolic Blood Pressures for Hypothesis 4

Group	Pre-Procedure			Post-Procedure		
	Range	Mean	SD	Range	Mean	SD
Control	104-195	145.1	27.4	100-180	134.95	23.08
Intervention	106-190	139.5	19.95	111-219	138.24	23.22

Table 6

Analysis of Diastolic Blood Pressures for Hypothesis 4

Group	Pre-Procedure			Post-Procedure		
	Range	Mean	SD	Range	Mean	SD
Control	60-111	78.4	12.94	60-109	77.85	13.25
Intervention	68-102	81.4	12.47	60-102	77.1	11.36

Based on the ANCOVA, of the four hypotheses, only number 2 regarding anxiety was supported. After finding this one difference with ANCOVA, the researcher was interested in seeing if there were any changes in the dependent variables within the groups. In order to see if there were significant changes from pre to post scores in each group a paired t-test was performed. The paired-t-test found that the intervention group made significant improvement in two areas, pain and anxiety, and although not statistically significant, the diastolic blood pressure was trending (see Table 7). The control group demonstrated a statistically significant change in their systolic blood pressure ($t = 4.671$; $df = 19$; $p = .000$) although, as the values demonstrated above, clinical significance is minimal as the blood pressures ranged from 104-195 mmHg pre-IV insertion to 100-180 mmHg post-IV insertion.

Table 7

Paired t-test for Differences Within Groups

Variable	Mean		SD		t	df	p
	pre	post	pre	post			
<u>Control</u>							
Pain	39.30	40.50	32.03	31.89	-0.331	19	0.744
Anxiety	44.50	38.55	34.15	32.07	0.649	19	0.524
Pulse	81.55	77.05	18.54	18.07	1.961	19	0.065
Systolic	145.10	134.95	27.37	23.18	4.671	19	0.000
Diastolic	78.40	77.85	12.94	13.25	0.220	19	0.828
<u>Intervention</u>							
Pain	53.00	48.52	29.65	30.37	2.742	20	0.013
Anxiety	44.52	38.05	30.23	31.03	3.049	20	0.006
Pulse	79.52	78.00	14.43	13.45	0.921	20	0.368
Systolic	139.48	38.24	19.95	23.22	0.286	20	0.778
Diastolic	81.43	77.05	12.47	11.36	2.005	20	0.059

A final statistical analysis was performed to find out if any of the differences reported were due to variances in the demographics of the subjects. To determine if there was a statistical difference between groups in regards to age and education a t-test was employed. A chi-square was used to determine differences between the control and intervention groups in regards to the nominal data of gender, history of being anxious, and degree of pain tolerance.

The t-test demonstrated no statistical difference between the control group and the intervention concerning age ($t = 1.697$; $df = 39$; $p = 0.098$) and education ($t = -0.841$; $df = 38$; $p = 0.406$). Likewise, the chi-square found no statistically significant difference between the groups when taking into account gender ($X^2 = 1.000$; $p = 0.57$), history of being anxious ($X^2 = 0.734$; $p = 0.405$), and level of pain tolerance ($X^2 = 0.627$; $p = 0.731$). The t- test and the chi-square proved that there is no statistical difference between the

control and intervention group. Demographically the two groups were relatively homogeneous despite the fact that they were not randomly selected. Statistically proving that the groups are equal allows confidence in saying that the changes seen with pain, anxiety, and diastolic blood pressure are due to the intervention of music.

Additional Findings of Interest

Source of Pain. Documentation was done regarding the subjects source of pain when they completed the pre-IV insertion VAS. They were asked to consider all of their pain at that precise moment and include that in the VAS. This was documented on the area provided on the pre-procedure VAS form. Subjects were found to have a wide variety of physical complaints. Eleven of the 41 subjects were experiencing abdominal pain including pelvic pain. Ten people documented chest pain as their source of discomfort. Back and neck pain was experienced by five subjects. Orthopedic problems of the extremities along with cellulitis caused pain for eight subjects. Finally, generalized flu type symptoms including sore throats and body aches caused discomfort for four individuals. Four individuals were experiencing no pain prior to IV insertion and eight people described more than one area of discomfort.

Musical Choice. Three selections were offered in each of five categories including rock, designer, country, jazz, and classical. Of the 21 subjects in the intervention group 33% chose country, 48% listened to designer music, 10% selected jazz, and 9% listened to rock. One subject commented that “usually I like this music but I don’t with all this pain.” Another subject who had often had problems with IV insertion in the past commented that “this was the easiest IV I ever had, the music really helped relax me.”

Length of Time. Times were recorded regarding when the subject began to listen to music, when the IV was inserted, and when data collection was completed. An average of 7.14 minutes elapsed from the start of the music until the IV was inserted. The times ranged from two minutes to 17 minutes. Time from IV insertion to collection of data averaged 6.43 minutes. One subject received music for two minutes while the remaining 20 people listened between five and ten minutes from IV insertion to the end of data collection.

Subjective Comments. The majority of people provided positive yet unenthusiastic comments in regards to listening to music. Comments such as “I guess it helped”, “it was alright”, and “it relaxed me somewhat” were common. Five subjects declined to comment either positively or negatively. Two subjects, one suffering physically and emotionally from domestic abuse and experiencing chest wall and rib pain and another women experiencing severe abdominal pain found the music so distracting that it made their pain worse. They both commented on the fact that it “took everything I had to concentrate on the pain” and the music, rather than serving as a distraction, took their focus point away and made things worse.

Positive comments included “what a great idea”, “I felt better while it was playing”, and simply “it helped”. One subject was annoyed by the music initially because it was too loud. Once the volume was adjusted she enjoyed relaxing to it and found it quite helpful. Ironically, of the subjects who did enjoy the music only one continued to listen to music after the post-procedure data was collected.

Summary

Hypothesis 2 stated that patients who listen to music will report a decrease in anxiety during IV insertion as compared to the non-music group. This hypothesis was supported by ANCOVA and found to be statistically significant [$F(1, 37) = 10.39; p = 0.003$]. When the t-test and chi-square were performed to test for group homogeneity, it was reported that the groups were equal in regards to the demographic data collected. With equal groups being studied and the covariate of pre-IV insertion VAS for anxiety statistically adjusted, it can be reported with confidence that music played during IV insertion helps lower anxiety levels.

Chapter 5

Discussion and Implications

Discussion Related to Hypotheses

Hypothesis 1. The ANCOVA did not support the hypothesis that subjects who listened to music would experience a decrease in pain when compared to the non-music group. Subjects in the intervention group did not experience a significant decrease in their pain when compared to the control group. However, when looking within groups, a paired t-test did show a significant decrease in pain from pre- procedure to post-procedure for the intervention group. The small sample size may have attributed to the ANCOVA findings.

The majority of the subjects in this study were experiencing severe pain. In the case of several subjects the pain was so severe that an IV insertion could not compare to the intensity of their pain. Subjects were asked to take all of their pain into consideration when marking the VAS. However, the degree of pain together with the distractions inherent in the environment could explain why music is not enough to decrease severely acute pain significantly.

Hypothesis 2. Controlling for pre-procedure anxiety, the ANCOVA found that music significantly effected the post-procedure anxiety of the intervention group when compared to the control group. Allowing musical choice could be one reason people were less anxious. People often looked forward to going through the collection of music and finding something that appealed to them. Several subjects, prior to agreeing to participate, commented “are you going to make me listen to elevator music”. This may

demonstrate people's desire to listen to something they are familiar with and how that familiarity can bring about relaxation in an unfamiliar environment.

One researcher performing the data collection may have helped decrease anxiety levels. Data was not influenced by different attitudes, biases, and styles of other researchers. In addition, the researchers skill level may have influenced anxiety levels. Of the 41 subjects only one had to go through a second IV attempt. Several subjects commented that they were much more relaxed after the IV was successfully inserted the first time as they had bad experiences in the past.

It is necessary to discuss the large F value obtained with analysis of covariance. It is assumed that the large value is due to the small sample size. The clinical significance of the findings must also be questioned as the post procedure means for both groups were virtually the same ($M = 38.6$; $SD = 32.1$ and $M = 38.1$; $SD = 31.0$ for the control and intervention groups, respectively).

Hypothesis 3. There was not a significant difference in pulse measurements after IV insertion between the control and experimental groups. This may go along with the fact that pain did not improve either. Physiologic and pharmacological processes may have accounted for the lack of support. One subject was hyperthermic with a temperature over 102 degrees accounting for his tachycardia and five other subjects were bradycardic due to being on beta-blocker therapy. Music may not be able to positively affect heart rates when such processes are influencing the body. The length of time one listened to music may not have been sufficient to decrease pulse. In addition, people often did not get to relax in the environment due to interruptions and personal concerns regarding their health.

Hypothesis 4. The ANCOVA did not support hypothesis 4. Patients who listened to music did not experience a decrease in either systolic or diastolic blood pressure in comparison to the control group. The paired t-test was trending towards significance with diastolic blood pressures in the intervention group, however, the mean diastolic blood pressure pre-procedure and post-procedure only changed from 81.43 to 77.05, respectively.

Relationship of Findings to Conceptual Framework

This study was guided by Neuman's systems model (Neuman, 1995). Neuman's model was assessed as an appropriate structure for this study. It emphasizes a holistic view with both the client and nurse considered part of the immediate system of interaction. Neuman believes that each person is unique and in constant change and flux in relation to environmental influences. This is especially useful in the hectic environment of the ED. The model encourages the nurse to learn about the clients' experiences, expectations, and views about their health. In other words, it is necessary to understand a client's internal and external environment. Since only one researcher collected the data, there was an ability to develop a relationship with the client and discover their fears, expectations, and more importantly, experiences in regards to past IV attempts and ED visits.

Contrary to expectations, the ANCOVA was unable to prove that music was an effective tool in decreasing levels of pain, pulse, and blood pressure. Paired t-test studies, however, demonstrated that music within the intervention group offered a significant improvement in pain, anxiety, and diastolic blood pressure. Neuman (1995) describes nursing interventions as attempts toward general improvement of client system capability and better adjustment of behavioral patterns. The application of music is one intervention

that may lead to these improvements and build a clients lines of resistance, lines that prevent stressors from threatening the viability of the system.

Unique to Neuman's system model is the created environment (1995). The created environment "acts as a safety net or shield against the reality of the environment" (p. 322). A client's future opinions of nursing care and the ED may be enhanced due to the fact that their created environment experienced music.

Discussion of Findings Related to Previous Research

The review of literature regarding the use of music to decrease pain and anxiety is inconclusive. As reported earlier, the results of the studies varied widely.

Pain. The majority of literature found that music did not offer a significant decrease in pain between the control and experimental groups. One study (Schorr, 1993) found that the music increased the pain threshold. Quite the opposite was found in this study. Several subjects mentioned that the music did not allow them to focus on their pain thus making the pain less tolerable. Research data has been collected in a variety of different environments. Those that demonstrated improvement in pain occurred in operating and recovery rooms as well as ICU's. Patients in these environments experience more personalized one on one care as compared to the ED where care is episodic, fast, and performed by numerous people.

Anxiety. Literature reviews are divided almost equally in regards to whether or not music effectively decreased subject's anxiety. This study did demonstrate a significant decrease in anxiety levels supported by the ANCOVA as well as a decrease in the intervention groups anxiety level from pre-procedure to post-procedure supported by the paired t-test. A reason for this decrease may be due to allowing musical choice. A

majority of past research that positively affected anxiety allowed their subjects to have musical choice. Studies involving music have been performed, for the most part, in the ICU and operating and recovery rooms. These environments, in addition to the ED, can produce great amounts of anxiety as patients anticipate their outcomes. In contrast, the subjects with anxiety levels that were not helped by music were also studied in the same environments. In some aspects, music seems to be an effective tool to decrease anxiety levels, however, more research is needed.

Physiologic Changes. For the most part, literature reviews report that pulse rates and blood pressures dropped when music was used. The results vary widely, however. Pain and anxiety greatly influence pulse and blood pressure due to epinephrine and cortisol. Pain was decreased within the intervention group, however, it was not significantly effected between the groups. For this reason, it may be implied that physiologic changes would not improve with the use of music. Menegazzi et. al. (1993) and Updike (1990) were the only studies that reported a significant decrease in pain as well as pulse and blood pressure. In the remaining studies if pain or anxiety did not decrease neither did the pulse and blood pressure.

Subjective Comments. The majority of subjects in previous studies reported that they would use music therapy again. Although the 66 % of participants in this study felt the music was helpful, there were several people, as mentioned previously, who felt that the music decreased their pain tolerance. This correlates with previous research where the subjects experiencing more acute pain found the music less desirable and helpful. It contrasts Schorr's 1993 study which reported clients felt their pain threshold increased. Her subjects, however, were experiencing the chronic disease of rheumatoid arthritis and

they were being studied in their home. Lack of support in this study could be due to the severity of the acute pain as well as the ED environment with its episodic care.

Limitations

The generalizability of the findings of this research study is limited by its small, non-random sample. This research would be more applicable to the population had it involved a larger, randomly selected sample size. A strength of this study, however, was that demographically the two groups were relatively homogenous. The period of time allotted for data collection was not sufficient. The researcher did not anticipate the number of potential subjects that would refuse to participate as well as the number of subjects who were too acutely ill to be included in the sample.

The ED environment is a difficult area to perform pre-test/post-test studies. Patients are often in acute pain and requiring immediate analgesia. Often people are unable to concentrate due to the multiple distractions caused by others and the surroundings itself. This study took place in an eight bed ED with rooms separated only by curtains. This claustrophobic type of environment could have intensified the number of distractions. In addition, frequent interruptions from laboratory, radiology, cardiopulmonary, and medicine may have biased results. Tests often had to be delayed for the predetermined five minutes following IV insertion so as not to bias results. This in turn delayed patient testing and access to analgesia.

It was felt that the use of headphones hindered more than helped in this study. The original thought regarding the headphones was that they would decrease anxiety levels by serving as a barrier to distractions. Researcher observations found that subjects were uncomfortable wearing the headphones. Several subjects were dropped from the study

because they removed the headphones the minute someone opened the curtain or talked to them. Subjects were often interrupted by personnel from laboratory, radiology, and cardiopulmonary. People were uncomfortable being seen with the headphones on. One subject said, "this must look great, I'm supposed to be sick and I'm lying here listening to music through a pair of headphones." Several subjects commented that they thought they would miss valuable information regarding their plan of care or progress.

Another limitation may have centered around a lack of trust. Neuman (1995) discusses the caring caregiver. This implies that nurses act to protect clients' "preferences, privileges, wants and desires, health, and needs rather than their own" (p. 67). Nurses need to show their clients that they are caring caregivers. Often it may take longer than a nurse's brief introduction to establish this sense of trust. People were often asked to participate in the study just minutes after arriving in the claustrophobic, technical, and seemingly non-caring milieu. This may not have been enough time for the client to build a trusting relationship of the environment nor the caregivers. In addition, the application of the headphones signified the loss of one of the subjects five senses. Hearing is essential in building a trusting relationship. It would seem apparent that trust must be established before one is comfortable enough to give up their sense of hearing and allow a stranger to stick a needle in their arm.

The short duration of time that the subject was allowed to listen to music prior to and after IV insertion poses a limitation. None of the studies cited in the literature review discussed the length of time music was used prior to or after a procedure. This study averaged 7.14 minutes from the onset of music to IV insertion and 6.43 minutes after IV

insertion to the collection of data. It is felt that this is not enough time to allow people to relax completely. Nor was it enough time to decrease levels of pain.

Finally, listening to music may be a learned experience. People use different ways to relax and focus on the particular situation that is causing them stress. For some, music is the perfect avenue to provoke feelings of relaxation and stress reduction. For others, as seen with this research, music distracted subjects away from established forms of mood stabilization and increased their pain.

Implications for Nursing

Nurses deal with pain and anxiety on a daily basis. A client who experiences decreased pain and anxiety during their encounter benefits in multiple ways. When practice is based on a wholistic framework such as the Neuman's system model and clients are offered techniques that strength lines of resistance such as music, a client can achieve much greater physiological, psychological, and developmental outcomes. The use of music is one cost effective way to assist in improving these outcomes. Music is easy to implement in many surroundings. It may be especially helpful to advanced practice nurses who want to offer a distraction to their client when analgesia or sedation can not be dispensed immediately.

The findings of this study suggest an educational role for nurses. Nurses can educate themselves and others about the potential benefits of music to decrease pain and anxiety. By understanding a clients internal and external environment and through the use of music, nurses can strengthen their clients lines of resistance. Protection of the basic structure and an improved created environment may result from the decreased pain and

anxiety that these interventions produce. In addition, schools of nursing need to focus on pain management as part of their curriculum.

Nursing administrative roles may be influenced by this study. Leadership skills may be further developed as nurses take an active role in determining health care and services in their institution. Nurses with the knowledge gained from this study can improve quality assurance by demonstrating improved pain and anxiety control as well as subjective approval from their clients. This study supports patient advocacy by providing the client with tools that will improve their health care. Administrators need to see the potential offered by music and other therapies and support pain research.

This study was very cost-effective. Implementation of music would not place a financial burden on an institution but rather provide a great deal of relaxation and pleasant feelings about the care one receives. Finally, This study demonstrates the need for continuing nursing research in the area of pain and anxiety. Nurses and their clients will always benefit from the knowledge gained from research directed at controlling pain and anxiety.

Recommendations for Future Research

The results of this study encourage future research in the use of music to decrease pain and anxiety. The length of time one listens to music should be considered in future research. Studies should focus on the effectiveness of music when more privacy is offered. The use of music without headphones should also be considered so that the loss of the sense of hearing is not a factor. The application of this research on a general medical/surgical unit may improve results. This type of environment does not typically have the frequent distractions and interruptions experienced in an ED. Furthermore, the

patient on a medical/surgical floor has had time to establish a trusting relationship with the nurses on the unit. Other health occupations such as dentists, and rehabilitation therapists would benefit from studying music. Further research of music's effects on anxiety could be performed on people who are not experiencing pain prior to a procedure. For example, studying healthy subjects who present to a laboratory for blood collection. One could be more confident about the final results if pain did not have to be accounted for prior to the insertion. Finally, larger sample sizes and randomization will allow the data to be generalized to the population.

Summary

Nursing faces the challenge of crisis and opportunity on a daily basis (Neuman, 1995). Patients presenting to the ED are often in the face of crisis in regards to their health and well-being. Armed with research such as that found in this study, nurses can take a simple intervention such as music and turn a potential crisis into an opportunity for growth and appreciation.

APPENDICES

APPENDIX A

Permission to Conduct Research

APPENDIX A



GRAND VALLEY
STATE UNIVERSITY

1 CAMPUS DRIVE • ALLIEN TOWER, MICHIGAN 12711-7103 • 616/095-6611

July 21, 2009

Paula Nichols
3021 W. Higgins Lake Dr.
Roscommon, MI 489653

Dear Paula:

Your proposed project entitled **The Effects of Music in Decreasing Pain and Anxiety During Intravenous Insertion in the Emergency Department** has been reviewed. It has been approved as a study which is exempt from the regulations by section 46.101 of the Federal Register 46(16):8336, January 26, 1981.

Sincerely,

A black rectangular box redacting the signature of Paul A. Hinzenga.

Paul A. Hinzenga, Chair
Human Research Review Committee

APPENDIX A



MERCY HEALTH
SERVICES NORTH

A DIVISION OF THE SISTERS OF MERCY HEALTH CORPORATION

MERCY HOSPITAL/CADILLAC
400 HOBART STREET
CADILLAC, MI 49601
(616) 779-7200
FAX (616) 779-7439

MERCY HOSPITAL/GRAYLING
1100 MICHIGAN AVE
GRAYLING, MI 49736
(517) 383-5451
FAX (517) 349-4939

As Mercy Health Services North, Grayling does not have a research review committee we give our permission for Paula R. Nichols RN to research the effects of music on pain and anxiety during peripheral intravenous (IV) insertion in the emergency department.

We understand that subjects will be considered for the study only after a physician has evaluated the patient and determined the need for an IV and that under no circumstances will an IV be inserted merely for the purpose of this research.

[Redacted Signature]

Pattie Walker RN, BSN
Emergency department manager

[Handwritten Signature]

Alan Bersted MD
Medical director

APPENDIX B

Script

APPENDIX B

Script

Thank you for participating in this research. My name is Paula Nichols and I am studying to be a nurse practitioner through Grand Valley State University. Part of the degree requirement is to do a scientific study. The purpose of this study is to help nurses identify ways to increase their patient's comfort when starting IV's

You will be asked to answer a few questions about yourself, however, you will remain anonymous and your information private. Your blood pressure and pulse will be taken before the IV is inserted and again after the IV is inserted. You will be asked to place a mark on two separate scales. One scale asks about the level of pain you are experiencing and the other about how anxious you feel. These scales will be completed before the IV is inserted and again after the procedure. It will take approximately two minutes to complete the paperwork portion of the study.

FOR MUSIC GROUP: Part of this research is to study what effects music has on pain and anxiety. Prior to the insertion of the IV you will be asked to chose your favorite type of music from the selection offered . You will listen to the music through headphones prior to and during the IV start as well as after the procedure while you complete the paper work.

Participation in this study is strictly voluntary and poses no threat or risk to you. Be assured that you have the right to withdraw from the study at anytime and that your privacy will be protected at all times.

A card will be given to you with my name and number as well as the name of number of the chair person of the Grand Valley State University Research Review Committee. Feel free to contact either people if you have questions or concerns regarding the study. Again thank you for your participation and willingness to help.

APPENDIX C

Consent Forms

APPENDIX C

CONSENT FORM

I understand that this research studies the degree of pain and anxiety one experiences during intravenous (IV) insertion. I know that the knowledge gained from this experiment will help nurses provide more comforting care during IV insertion.

I also understand that:

1. participation in the study will involve completing paperwork that takes approximately two minutes to complete.
2. I have been selected for participation because I came to the emergency room for treatment.
3. This study will not lead to any physical or emotional risk to myself.
4. the information I provide will be kept strictly confidential and the data will be coded so that identification of individual participants will not be possible.
5. a summary of the results will be made available to me upon my request.

I acknowledge that:

1. "I have been given an opportunity to ask questions regarding this research study, and that these questions have been answered to my satisfaction".
2. "In giving my consent, I understand that my participation in this study is voluntary and that I may withdraw at any time without affecting the care I receive from my physician or the staff at Grayling Mercy Hospital."
3. "I hereby authorize the investigator, Paula R. Nichols, to release information obtained in this study to scientific literature. I understand that I will not be identified by name."
4. "I have been given the phone numbers of the investigator, Paula R. Nichols, and the chairperson of the Grand Valley State University Human Research Review committee, Paul Huizenga. I may contact them at any time if I have questions."

I acknowledge that I have read and understand the above information and that I agree to participate in this study.

Witness

Participant's Signature

Date

Date

APPENDIX C

CONSENT FORM

I understand that this is a study of how music effects pain and anxiety during intravenous (IV) insertion. I know that the knowledge gained from this experiment will help nurses provide more comforting care when starting IV's.

I also understand that:

1. participation in the study will involve completing paperwork that takes approximately two minutes to complete. I know that I will be selecting music of my choice and wearing headphones during IV insertion.
2. I have been selected for participation because I came to the emergency room for treatment.
3. This study will not lead to any physical or emotional risk to myself.
4. the information I provide will be kept strictly confidential and the data will be coded so that identification of individual participants will not be possible.
5. a summary of the results will be made available to me upon my request.

I acknowledge that:

1. "I have been given an opportunity to ask questions regarding this research study, and that these questions have been answered to my satisfaction".
2. "In giving my consent, I understand that my participation in this study is voluntary and that I may withdraw at any time without affecting the care I receive from my physician or the staff at Grayling Mercy Hospital."
3. "I hereby authorize the investigator, Paula R. Nichols, to release information obtained in this study to scientific literature. I understand that I will not be identified by name."
4. "I have been given the phone numbers of the investigator, Paula R. Nichols, and the chairperson of the Grand Valley State University Human Research Review committee, Paul Huizenga. I may contact them at any time if I have questions."

I acknowledge that I have read and understand the above information and that I agree to participate in this study.

Witness

Participant's Signature

Date

Date

APPENDIX D

Demographic Sheets

APPENDIX D

Please complete the following information about yourself

1. How old are you? _____ (in years)
2. How many years of school have you completed? _____ (in years)
3. Have you had an IV before?
 - _____ 1. Yes
 - _____ 2. No
4. Have you ever been a patient in an emergency department?
 - _____ 1. Yes
 - _____ 2. No
5. What is your gender?
 - _____ 1. Male
 - _____ 2. Female
6. Do you consider yourself an anxious person?
 - _____ 1. Yes
 - _____ 2. No
7. How would you describe your pain tolerance?
 - _____ 1. High
 - _____ 2. Medium
 - _____ 3. Low

APPENDIX D

To be completed by researcher:

successful IV start: yes no

VAS completed pre: () post: ()

number of attempts _____

Blood pressure pre-procedure _____

Blood pressure post-procedure _____

Pulse pre-procedure _____

Pulse post-procedure _____

Received music: yes no

start time of music _____

minutes listened to music prior to procedure _____

end time of data collection _____

Did patient continue to listen to music: yes no

Comments:


APPENDIX E

Instruments

APPENDIX E

Place a mark across the line at the point which best describes the amount of pain you are experiencing at this moment.

Pain as bad as it could be



No Pain

Pre-procedure pain

List sources of pain _____

APPENDIX E

Place a mark across the line at the point which best describes your anxiety at this moment.

As anxious as I could be

Not anxious

Pre-procedure anxiety

APPENDIX E

Place a mark across the line at the point which best describes the amount of pain you are experiencing at this moment.

Pain as bad as it could be

No Pain

Post-procedure pain

APPENDIX E

Place a mark across the line at the point which best describes your anxiety at this moment.

As anxious as I could be

Not anxious

Post-procedure anxiety

APPENDIX F

Business Card Given to Participants

APPENDIX F

Thank you for supporting nursing research.

For any questions or concerns you may contact the researcher:

Paula K. Nichols RN BSN CEN at 517-418-3113

or

Paul Hutzenga, Chairperson for the Human Research Review Committee at Grand Valley State University at 616-895-2172

APPENDIX G

Permission to use Neuman Systems Model Diagram

APPENDIX G

GRAND VALLEY STATE UNIVERSITY
KIRKHOF SCHOOL OF NURSING

STANDARD RELEASE FORM

I, Bruce Bennett, hereby give permission to the Grand Valley State University, Kirkhof School of Nursing,

- 1. To utilize photographs, films, video or audio taped segments of self for educational purposes.
- 2. To copy or reproduce the following material(s) for educational purposes, by faculty and/or students within said institution:

Copy of the Home Inspection
to provide for the course

3. _____

Date: 4/20/00 Signature: Bruce Bennett

Name Printed: Bruce Bennett

Institution/Agency: _____

Address: P.O. Box 111

City: East Lansing, MI

State: MI Zip: 48824

Witness: [Signature]

Witness: [Signature]

Date: 4-20-00

Date: 4-20-00

LIST OF REFERENCES

List of References

Arts, S., Abu-Saad, H., Champion, G., Crawford, M., Fisher, R., Juniper, K., & Ziegler, J. (1994). Age-related response to lidocaine-prilocaine (EMLA) emulsion and effect of music distraction on the pain of intravenous cannulation. *Pediatrics*, *93* (5), 797-801.

Augustin, P. & Hains, P. (1996). Effect of music on ambulatory surgery patients' preoperative anxiety. *American Operating Room Nurses*, *62* (4), 750-758.

Allen, K. & Blascovich, J. (1994). Effects of music on cardiovascular reactivity among surgeons. *Journal of the American Medical Association*, *272* (11), 882-884.

Barnason, S., Zimmerman, L., & Nieveen, J. (1995). The effects of music interventions on anxiety in the patient after coronary artery bypass grafting. *Heart and Lung*, *24* (2), 124-132.

Berlin, B. (1998). Music therapy with children during invasive procedures: Our emergency department's experience. *Journal of Emergency Nursing*, *24* (5), 607-608.

Butcher, N. (1995). Take two sonatas and call me in the morning. www.elibrary.com.

Cline, M., Herman, J., Shaw, E., & Morton, R. (1992). Standardization of the visual analogue scale. *Nursing Research*, *41* (6), 378-380.

Cole's Quoteables (1999, March 21). Retrieved March 21, 1999 from the World Wide Web: <http://www.starlingtech.com/quotes/qsearch.cgi>.

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

Davis, C. (1992). The effects of music and basic relaxation instruction on pain and anxiety of women undergoing in-office gynecological procedures. Journal of Music Therapy, XXIX (4), 202-216.

Donovan, M. (1982). Cancer pain: You can help. Nursing Clinics of North America, 17, 713-728.

Dubois, J., Barter, T., & Pratter, M. (1995). Music improves patient comfort level during outpatient bronchoscopy. Chest, 108 (1), 129-130.

Eisenman, A. & Cohen, B. (1995). Music therapy for patients undergoing regional anesthesia. American Operating Room Nurses, 62 (6), 947-950.

Gaberson, K. (1995). The effect of humorous and musical distraction of preoperative anxiety. American Operating Room Nurses, 62 (5), 784-791.

Gift, A. (1989). Visual analogue scales: measurement of subjective phenomena. Nursing Research, 38 (5), 286-288.

Good, M. (1995). A comparison of the effects of jaw relaxation and music on postoperative pain. Nursing Research, 44 (1), 52-57.

Guzzetta, C. (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.

Hatler, C. (1998). Using guided imagery in the emergency department. Journal of Emergency Nursing, 24 (6), 518-522.

Heiser, R., Chiles, K., Fudge, M., & Gray, S. (1997). The use of music during the immediate postoperative recovery period. American Operating Room Nurses, 65 (4), 777-785.

Jacobson, A. (1999). Intradermal normal saline solution, self-selected music, and insertion difficulty effects on intravenous insertion pain. Heart and Lung, 28 (2), 114-122.

Johnston, K. & Rohaly-Davis, J. (1996). An introduction to music therapy: helping the oncology patient in the ICU; Oncology patients in the ICU. Critical Care Nursing Quarterly, 4 (18), 54-64.

Karpen, M. (1996). Managing stress. Alternative and Complementary Therapies, July/August, 207-216.

Kiecolt-Glaser, J., Marucha, P., Malarkey, W., Mercado, A., & Glaser, R. (1995). Slowing of wound healing by psychological stress. The Lancet, 346, 1194-1196.

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

Magill-Levreault, L. (1993). Music therapy in pain and symptom management. Journal of Palliative Care, 9 (4), 42-48.

Marchette, L., Main, R., & Redick, E. (1989). Pain reduction during neonatal circumcision. Pediatric Nursing, 15 (2), 207-210.

McCance, K. L. & Huether, S. E. (1998). Pathophysiology: The Biologic Basis For Disease in Adults and Children (3rd ed). St. Louis, Missouri: Mosby.

McCraty, R., Barrios-Choplin, B, Atkinson, M., & Tomasino, D. (1998). The effects of different types of music on mood, tension, and mental clarity. Alternative Therapies, 4 (1), 75-84.

Menegazzi, J., Paris, P., & Kersteen, C. (1991). A randomized, controlled trial of the use of music during laceration repair. Annals of Emergency Medicine, 20 (4), 348-350.

Mornhinweg, G. (1992). Effects of music preference and selection on stress reduction. Journal of Holistic Nursing, 10 (2), 101-109.

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

Neuman, B. (1995). The Neuman Systems Model (3rd ed.). Stanford, Connecticut: Appleton & Lange.

Nigroni, P., Lam, S., & McLaughlin, K. (1989). Accuracy of indirect blood pressure measured by oscillometry: A comparison of Datascope's non-invasive blood pressure monitor with the auscultatory method. Datascope Corporation, Paramus, NJ.

O'Callaghan, C. (1996). Pain, music creativity and music therapy in palliative care. Complementary Medicine International, March/April, 43-48.

Palakanis, K., DeNobile, J., Sweeney, B., & Blankenship, C. (1994). Effect of music therapy on state anxiety in patients undergoing flexible sigmoidoscopy. Diseases of the Colon and Rectum, 37 (5), 478-481.

Paris, P. & Stewart, R. (1992). Analgesia and Sedation. In Rosen, P.; Barkin, R.; Baen, G.; Dailey, R.; Hedges, J.; Hockberger, R.; Levy, R.; Marx, J.; & Smith, M. (Eds.), Emergency Medicine Concepts and Clinical Practice (3rd ed., p. 201-228). St. Louis, MO: Mosby.

Pfaff, V., Smith, K., & Gowan, D. (1989). The effects of music assisted relaxation on the distress of pediatric cancer patients undergoing bone marrow aspirations. Children's Health Care, 18 (4), 232-236.

Rasco, C. (1992). Using music therapy as distraction during lumbar punctures. Journal of Pediatric Oncology Nursing, 9(1), 33-34.

Schott, J. (1993). Music and pattern change in chronic pain. Advanced Nursing Science, 15, (4), 27-36.

Stapleton, S. (1998). Alternative medicine: Time to talk. American Medical News, 41 (46), 26.

Tanabe, P. & Buschman, M. (1999). A prospective study of ED pain management practices and the patient's perspective. Journal of Emergency Nursing, 25 (3), 171-177.

U.S. Department of Health and Human Services. (1994). Management of cancer pain, clinical practice guidelines (AHCPR Publication No. 94-0592). Rockville, MD.

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

Vogelsang, J. (1988). The visual analog scale: an accurate and sensitive method for self-reporting preoperative anxiety. Journal of Post Anesthesia Nursing, 3 (4), 235-239.

Watkins, G. (1997). Music therapy: Proposed physiological mechanisms and clinical implications. Clinical Nurse Specialist, 11, (2), 43-50.

Weisenberg, O., Wolf, Y., & Raphaeli, N. (1984). Relevant and irrelevant anxiety in the reaction to pain. Pain, 20, 371-383.

Wewers, M.& Lowe, N. (1990). A critical review of visual analogue scales in the measurement of clinical phenomena. Research in Nursing and Health, 13 (4), 227-236.

White, J. (1992). Music Therapy: An intervention to reduce anxiety in the myocardial infarction patient. Clinical Nurse Specialist, 6 (2), 58-63.