A Music Intervention to Reduce Anxiety Prior to Gastrointestinal Procedures

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Patients scheduled for gastrointestinal procedures such as colonoscopy or esophagogastroduodenoscopy are often anxious and frightened. High levels of anxiety may result in more difficult and painful procedures. Past research has reported education, coping skills, relaxation techniques, and combinations of these including music, have decreased anxiety in patients across many settings. Self-selected music therapy for preprocedural anxiety has not been studied. A randomized controlled trial of 198 patients was undertaken to determine whether 15 minutes of self-selected music reduced preprocedure anxiety. The State Trait Anxiety Inventory was used to measure patients' anxiety. One-hundred ninety-three men and 5 women comprised the sample with an average age of 61 (*SD* 10.5). Patients who listened to music ($n = 100$) reduced their anxiety score from 36.7 (*SD* 9.1) to 32.3 (*SD* 10.4), while those who did not listen to music ($n = 98$) reduced their anxiety score from 36.1 (*SD* 8.3) to 34.6 (*SD* 11.5). These differences were statistically significant ($F = 7.5$, $p = .007$) after controlling for trait anxiety. There were no significant vital sign changes premusic and postmusic. Music is a noninvasive nursing intervention that can significantly reduce patients' anxiety prior to gastrointestinal procedures. Further research should address using music to reduce anxiety in other procedure areas and testing effectiveness of self-selected versus investigator-selected music in reducing anxiety.

Patients scheduled for gastrointestinal (GI) procedures such as colonoscopy or esophagogastroduodenoscopy (EGD) are often anxious and frightened. They are fearful the procedure will be painful and express aversion for instruments inserted into their rectum. Such procedures have considerable and variable impact on patients' discomfort, feelings of vulnerability and embarrassment, and fear about possible findings revealed by the procedure. While the procedures are likely to help the patient, they may also evoke significant anxiety, thus leading patients to avoid the examinations and miss the benefits (Brandt, 2001). Additionally, high levels of anxiety may result in a more difficult and painful procedure, incomplete procedures, greater medication use, and the increased likelihood of sedative-related complications (Dominitz & Provenzale, 1997; Hynam, Hart, & Gay, 1995; Kelly &

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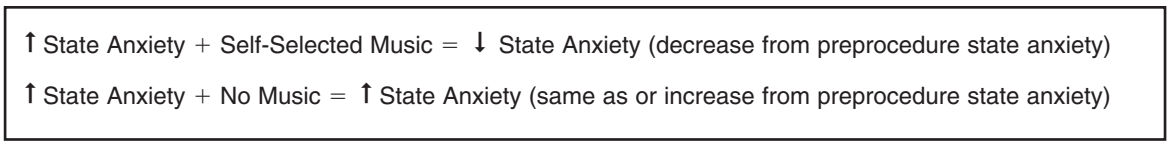

FIGURE 1. Conceptual Model for Music Intervention Based on Spielberger's Theory of Anxiety

Shank, 1992). The current study involves a noninvasive nursing intervention—music—as a means to reduce preprocedure anxiety.

Literature Review and Theoretical Approaches

Anxiety, as defined by Spielberger (1976), is an emotional state consisting of feelings of tension, apprehension, nervousness, and worry with activation or arousal of the autonomic nervous system. Spielberger differentiates between two components of anxiety: state anxiety and trait anxiety. State anxiety is a transitory emotional state reflective of one's interpretation of a particularly stressful situation. Trait anxiety is the relatively stable individual differences in being prone to anxiety manifested in behavior, as well as the frequency with which an individual experiences elevations of state anxiety over time. The two components of anxiety are related in that trait anxiety can be equated to one's propensity to elevations in state anxiety (Spielberger, 1966, 1976). Based on Spielberger's definitions, reduction in state anxiety prior to a diagnostic GI procedure may help promote relaxation and prevent some possible complications during the procedure.

Anxiety has been recognized as problematic for patients undergoing GI procedures. Several studies have examined various methods of anxiety reduction for GI procedures, both prior to and during the procedures. Luck, Pearson, Maddern, and Hewett (1999) studied 150 patients scheduled to undergo colonoscopy to determine whether providing an informational video, in addition to verbal and written communication, would decrease anxiety levels and increase knowledge about the procedure. They found patients who watched the video were significantly less anxious and exhibited more knowledge about the procedure than the patients who did not.

Hackett, Lane, and McCarthy (1998) examined the effects of preparatory cognitive and behavioral information on self-confidence, anxiety, and negative affect in 48 male and female patients undergoing upper endoscopy. They found preparatory information in general was effective in reducing anxiety and in increasing self-confidence. They also found teaching subjects visualization before a procedure increased their use of visualization during the procedure.

Morgan, Roufeil, Kaushik, and Bassett (1998) studied the relationship between patient coping style, precolonoscopy information, and anxiety and pain associated with colonoscopy. Eighty adult patients undergoing first-time colonoscopy were divided into two groups, information-seekers or information-avoiders, based on their coping style. All subjects were given standardized information about colonoscopy and half of each group was randomly assigned to receive additional sensory information about what they could expect to feel. Self-reported, physiological, and behavioral indices of anxiety and pain were measured. The results showed provision of information congruent with individuals' coping styles reduced anxiety, recovery time, and observed behavioral indices of pain, although it had no effect on amount of sedation dose or patient perception of pain.

Few GI studies have examined the use of music to reduce anxiety. One such study by Salmore and Nelson (2000) explored the effects of relaxation using imagery and audiotaped relaxation music to decrease anxiety and reduce amount of pain medication in 63 patients undergoing EGD or colonoscopy. Anxiety was measured by blood pressure and pulse changes taken at home, during admission, during the procedure, and at discharge from the hospital. Their findings showed subjects in the relaxation imagery and music group (n = 30) had significantly lower blood pressures throughout the procedure than the controls (n = 33), but there were no significant differences between groups regarding the amount of medication used.

A gap in the GI literature is the use of music alone as a method for reducing anxiety prior to a GI procedure. Music and music therapy have potential for being inexpensive, noninvasive methods of relieving preprocedural anxiety.

Music therapy is defined by Munro and Mount (1978) as the controlled use of music, its elements, and their influences on humans to aid in the physiological, psychological, and emotional integration of the individual during the treatment of an illness or disability. Music therapy is widely reported in the medical literature and several studies have examined the effects of music therapy on anxiety. Bolwerk (1986), Guzzetta (1989),and White (1992) examined the effects of relaxing music on hospitalized patients with acute myocardial infarcts. Updike (1990) examined the effects of relaxing music on medical and surgical intensive care patients. All studies demonstrated statistically significant reduction in psychological or physiological indices for the groups that listened to music. All studies used investigator-selected music, primarily classical music. The application of self-selected music therapy for preprocedural anxiety in GI patients has not been studied. Spielberger's (1966) theory of anxiety guided the conduct of this investigation, focusing on using music to reduce preprocedure state anxiety levels. Using Spielberger's theory of anxiety, the conceptual model is presented in Figure 1.

Study Purpose and Significance

Patients' fear and anxiety prior to GI exams pose considerable nursing care challenges. Nurses need more strategies to assist patients with their high levels of anxiety. Music has the potential to relax patients and reduce their anxiety. Effective nursing interventions that include anxiety reduction can reduce discomfort, feelings of vulnerability and embarrassment, and fear about possible findings. Music can be an uncomplicated nursing intervention not requiring a physician's order.

The aim of the study was to evaluate whether a music intervention reduced patients' anxiety prior to GI procedures. The research questions were:

1. Will listening to music for 15 minutes prior to a GI procedure reduce patients' anxiety?
2. Will listening to music for 15 minutes prior to a GI procedure decrease patients' blood pressure and pulse rates?

Methods

This study used a repeated measures experimental design with randomization of the patients to either the music or control group. The study was conducted in the GI Diagnostic Center at an urban, university-affiliated, west coast Veterans Affairs Medical Center. The institutional review board approved the study.

Patients were included if they were undergoing a colonoscopy or EGD for the first time, were 18 years of age or older, English-speaking, able to read at a 5th grade level, and able to sign the study consent. Patients were excluded if they were actively psychotic or had dementia or if they could not listen to music for a 15-minute period prior to their GI procedure

Our sample size of 200 patients was based on the likelihood of retaining 96 persons in each group, which would increase the chance of detecting a true difference in anxiety scores between the control and experimental groups. Based on past literature, White (1992) found a mean difference of 5.1 in state anxiety scores (using the State Trait Anxiety Inventory) between the control ($M = 42.2$, $SD = 7.5$) and experimental groups ($M = 37.1$, $SD = 7.9$) ($F = 29.7$, $p < .001$). The control group had 25 minutes of quiet time with no music and the experimental group had 25 minutes of investigator-selected music. Based on this difference with large variability, the effect size is approximated at .50. Using a two-sided *t*-test, the sample size needed for a power of .80 with alpha (two-sided) of 0.01 and beta of 0.20 is 96 per group (Hulley, Cummings, Browner, Grady, & Newman, 2001).

Procedure

The GI clinic charge nurse and one of the co-investigators screened all patients scheduled for their first-time colonoscopy or EGD, approached the patients, explained the study, inquired about interest, determined eligibility, and offered an opportunity for signing the consent. Patients were approached in the GI Diagnostic Center prior to the scheduled procedure.

Once consented, patients were randomized using a table of random numbers to either the experimental group (15-minute preprocedure music intervention) or the control group (standard care of 15 minutes). Patients were unaware of their group assignment until they signed the consent form. Preprocedure, they completed a demographics form and state and trait anxiety forms. To avoid introducing more anxiety with the explanation for the GI procedure, the consent process for the GI procedure was delayed until after patients completed the music study.

Experimental Group

Patients assigned to the music group were: 1) given a choice of music (one selection from five categories veterans selected in a prior study: classical, jazz, rock, country western, easy listening); 2) taken to the procedure area to listen to music for 15 minutes; 3) had their blood pressure and heart rate taken before and after the music; 4) were given the State Anxiety Scale and the Music Enjoyment Scale after the music; 5) proceeded to their procedure and were given an option to continue listening to the music.

Control Group

Patients assigned to the control group: 1) were taken to the procedure area where they waited for 15 minutes; 2) had their blood pressure and heart rate taken on arrival and immediately before the GI procedure; 3) were given the State Anxiety Scale immediately before the GI procedure; 4) were given an opportunity to select and listen to music during the procedure.

Instruments

Anxiety was tested using the 40-item Spielberger (1977) State-Trait Anxiety Inventory (STAI, state and trait forms). Twenty statements describe trait anxiety (Trait Anxiety Scale) or how one generally feels in terms of frequency rating with the higher score indicating higher anxiety: 1–4 indicating almost never, sometimes, often, and almost always. Twenty statements describe state anxiety (State Anxiety Scale) or how one feels at this moment in terms of intensity with a higher score indicating higher anxiety: a score of "1" indicates "not at all;" a score of "2" indicates somewhat, "3" indicates moderately so, and "4" indicates a score of "very much so."

This tool has been tested in all age ranges for determining psychological stress reactions (State Anxiety Scale) and the personality characteristic (Trait Anxiety Scale). The Trait Anxiety Scale is expected to be enduring while the State Anxiety Scale is specifically designed for testing the current emotional state. Often a high Trait Anxiety Scale score predicts a high State Anxiety Scale score.

Reliability using Cronbach alpha is reported at .90 and .93 (Spielberger, 1977). In pilot testing of the state STAI with the GI Clinic population ($n = 8$, ages 53–76 years), a completion time of 3 minutes, ease of use, and no verbalized complaints or questions were noted. The state form was given prior to the trait form per instructions by the STAI author (Spielberger, 1983).

Persons who listened to music completed an investigator-created Music Enjoyment Scale used for determining the patient's rating of music enjoyment. This is a 2-item "yes–no" questionnaire asking the patient whether he or she enjoyed hearing the music, and whether the music helped relaxation. This scale takes less than 1 minute to complete.

Additionally, vital signs and demographics were collected. The demographic questionnaire solicited information including age, sex, whether or not music was usually listened to, and if so, where.

Data Analysis

Data were analyzed using descriptive statistics and multivariate analyses of covariance (MANCOVA). Descriptive statistics were used for describing the sample and scoring the anxiety scales and the Music Enjoyment Scale. The two research questions were answered using MANCOVA. The

MANCOVA included a factor for time to test for change in anxiety over time. There was also a factor to test if the two groups differed in anxiety. Finally, an interaction term was included to test whether the two groups experienced differences in how much change in anxiety they experienced between the two assessments. All analyses controlled for trait anxiety.

Results

Two hundred persons were enrolled and two were dropped due to incomplete data. A total of 198 patients participated in the study with 100 assigned to the music group and 98 assigned to standard care (control) group. The average age was 61 years (*SD* 10.5, range 29–84 years) and there were 193 men and 5 women.

The norms for the Spielberger's Anxiety Inventory for ages 50–69 have been established as follows: 1) state anxiety scale score means range between 32.2 (*SD* 8.6) and 34.5 (*SD* 10.3); 2) trait anxiety scale score means range between 31.7 (*SD* 7.7) and 33.86 (*SD* 8.8). The patients in this study were slightly more anxious than the population norms with a state anxiety scale mean of 36.4 (*SD* 8.6) and trait anxiety scale mean of 37.8 (*SD* 10.5).

Findings from the research questions follow. For the question "Will listening to music for 15 minutes prior to a GI procedure reduce patients' anxiety?" data showed the patients who listened to music had significantly greater reduction in anxiety scores. Those who listened to music reduced their state anxiety scale scores from an average of 36.7 (*SD* 9.1) to 32.3 (*SD* 10.4) while those in the control group reduced their state anxiety scale score from 36.1 (*SD* 8.3) to only 34.6 (*SD* 11.5). The *F*-test for the interaction of group by time revealed those in the music group reduced their anxiety significantly more than those in the nonmusic group ($F = 7.5$, $p = .007$), revealing that music makes a difference in reducing anxiety.

For the second question, "Will listening to music for 15 minutes prior to a GI procedure decrease patients' blood pressure and pulse rates?" there were minimal differences between groups' vital signs, which were not significant. These vital sign changes are shown in Table 1.

Ninety seven percent of participants stated they enjoyed the music and 89% stated they felt relaxed after listening. Ninety nine percent stated they generally listen to music, with 16% listening at home and 84% listening in more than one location (e.g., car, work, other).

Discussion

According to Spielberger's norms for anxiety scores, patients in this study are anxious before their first experiences with a colonoscopy or EGD. Since anxiety impacts psychological and physiological responses to these procedures, nurses need to use strategies to decrease patients' anxiety prior to their G.I. procedures. In this investigation, even 15 minutes of self-selected music decreased anxiety. Further, patients expressed enjoyment in this noninvasive intervention. The anxiety reduction using music is consistent with others' findings in medical-surgical hospital settings (Bolwerk, 1986; Guzzetta, 1989; White, 1992; Updike, 1990).

Listening to music made no statistically significant impact on differences in physiological measurements of blood pressure, heart rate, and respirations. The current study did not evaluate patients' medications, but many veterans take antihypertensives and cardiac medications that

TABLE 1

Comparison of Means and Standard Deviations (*SD*) Blood Pressure and Pulse Rates Premusic and Postmusic

	Systolic BP Score (*SD*)			
	Premusic	Postmusic	*F*	*p* value
Music	135 (18.7)	133.8 (16)	0.56	.45
No music	135.6 (17.6)	135.3 (18.4)		
	Diastolic BP Score (*SD*)			
	Premusic	Postmusic	*F*	*p* value
Music	79 (9.8)	77.7 (10.4)	1.6	.198
No music	78.5 (10.7)	77.9 (10.0)		
	Pulse Score (*SD*)			
	Premusic	Postmusic	*F*	*p* value
Music	71.3 (13.6)	70.4 (13.6)	0.53	.47
No music	70.8 (13.5)	70.8 (12.6)		

might explain minimal change in their vital signs. Further, the mean systolic and diastolic blood pressure values did not clinically indicate the need for reduction.

Our results differ from the significant blood pressure reductions that Salmore and Nelson (2000) found from augmenting music with practiced imagery techniques throughout the GI procedure. Our study used a different process of relaxation, employing only 15 minutes of self-selected music prior to the procedure. In contrast, Salmore and Nelson (2000) used extensive preprocedure relaxation training (e.g., instruction in the home and practice prior to the procedure).

Study Limitations

Study limitations include the length of time for listening to music, and sex of the participants. The literature mentions no specific therapeutic time period for music intervention. A 15-minute period was selected because it is close to the usual waiting period. This means the time period is nonintrusive for clinicians in the clinical environment, does not alter the clinical scheduling for all patients undergoing procedures, and is short enough to avoid being anxiety-provoking for the study participants. Since this study was conducted at a VA hospital, most of the patients were men. Findings cannot be generalized to women.

Anxiety measurement differs across music therapy studies, but all report significant reductions related to music intervention (Bolwerk, 1986; Guzzetta, 1989; White, 1992; Updike, 1990). While our study found significant anxiety reduction through the standardized Spielberger State Trait Anxiety Inventory, we did not compare anxiety reduction using self-selected music versus investigator-selected music (classical). Our patients felt strongly about the music they selected, suggesting they appreciated having the choice. Further research should address whether self-selected music (and which category) is more effective in reducing anxiety than investigator-selected or classical music. We did not evaluate the frequency of the category of music selected.

Implications for Practice and Research

Findings from this study suggest patients in GI preprocedure areas can benefit from listening to 15 minutes of self-selected music. As a result of this study, the G.I. Diagnostic Center is offering all patients self-selected music in the procedure rooms prior to their procedures. This inexpensive and effective intervention can easily be initiated by the nursing staff in anticipation of other diagnostic procedures within and outside of the GI arena. In sum, this study lends credence to using music to reduce anxiety prior to GI procedures; future research should address effectiveness of anxiety reduction with different categories of music and in other procedure areas.

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References

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

Brandt, L. (2001). Patients' attitudes and apprehensions about endoscopy: How to calm troubled waters. *American Journal of Gastroenterology, 96*(2), 280-284.

Dominitz, J., & Provenzale, D. (1997). Patient preferences and quality of life associated with colorectal cancer screening. *American Journal of Gastroenterology, 92*, 2171-2178.

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.

Hackett, M., Lane, M., & McCarthy, D. (1998). Upper gastrointestinal endoscopy: Are preparatory interventions effective? *Gastrointestinal Endoscopy, 48*(4), 341-347.

Hulley, S., Cummings, S., Browner, W., Grady, D., Hearst, N., Newman, T. (2001). *Designing clinical research*. (2nd ed.). Philadelphia: Lippincott, Williams & Wilkins.

Hynam, K., Hart, A., & Gay, S. (1995). Screening for colorectal cancer: Reasons for refusal of faecal occult blood testing in a general practice in England. *Journal of Epidemiology Community Health, 49*, 84-86.

Kelly, R., & Shank, J. (1992). Adherence to screening flexible sigmoidoscopy in asymptomatic patients. *Medical Care, 30*, 1029-1042.

Luck, A., Pearson, S., Maddern, G., & Hewett, P. (1999). Effects of video information on precolonoscopy anxiety and knowledge: A randomized trial. *Lancet, 354* (December), 2032-2035.

Morgan, J., Roufeil, L., Kaushik, S., & Bassett, M. (1998). Influence of coping style and precolonoscopy information on pain and anxiety of colonoscopy. *Gastrointestinal Endoscopy, 48*(2), 119-127.

Munro, S., & Mount, B. (1978). Music therapy in palliative care. *CMA Journal, 119*, 1029-1034.

Salmore, R., & Nelson, J. (2000). The effect of preprocedure teaching, relaxation instruction, and music on anxiety as measured by blood pressures in an outpatient gastrointestinal endoscopy laboratory. *Gastroenterology Nursing, 23*(3), 102-110.

Spielberger, C. (1966). *Theory and research on anxiety.* New York: Academic Press.

Spielberger, C. (1976). *The nature and measurement of anxiety.* Washington D.C.: Hemisphere Publishing.

Spielberger, C. (1977). *State-trait anxiety inventory for adults, Self-evaluation questionnaire STAI form Y-1 and Y-2*. Redwood City, CA: Mind Garden.

Spielberger, C. (1983). *State-trait anxiety inventory for adults, sampler set manual, test, scoring key.* Redwood City, CA: Mind Garden.

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

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