Effect of Music on State Anxiety Scores in Patients Undergoing Fiberoptic Bronchoscopy*

Henri G. Colt, MD, FCCP; Anne Powers, NP; and Thomas G. Shanks, MPH

Objective: **To study the effect of music on state anxiety levels in patients undergoing flexible fiberoptic bronchoscopy (FFB).**
Design: **Randomized clinical trial using pretests, posttests, and two groups.**
Setting: **Pulmonary special-procedures unit of a tertiary-care referral center.**
Patients: **Sixty adult patients: 30 patients received music during bronchoscopy and 30 control subjects received no music.**
Results: **The study population had baseline state anxiety levels similar to those previously reported in surgical patients (42.6 ± 13 vs 42.7 ± 14; p value, not significant [NS]) and higher than those reported in normal working adults (42.6 ± 13 vs 34.4 ± 10; $p < 0.001$). Experimental and control groups were similar in patient and procedure-related characteristics and baseline pre-FFB state and trait anxiety scores. Although trait anxiety scores decreased significantly after the procedure (pooled post-FFB scores of 32.6 ± 10 vs pre-FFB scores of 35.5 ± 11; $p < 0.001$), no reductions were noted in state anxiety (pooled post-FFB scores of 42.8 ± 13 vs pre-FFB scores of 42.6 ± 13; p value, NS). More importantly, playing music through headphones during FFB did not result in a statistically or clinically significant reduction in either state or trait anxiety when compared to control subjects.**
Conclusion: **Relaxation music administered through headphones to patients during flexible bronchoscopy does not decrease procedure-related state anxiety.**

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Key Words: anxiety; flexible bronchoscopy; music therapy; state-trait anxiety

Abbreviations: CI = confidence interval; FFB = flexible fiberoptic bronchoscopy; NS = not significant; STAI = State-Trait Anxiety Inventory

Anxiety in patients undergoing flexible fiberoptic bronchoscopy (FFB), as in most patients undergoing invasive medical procedures, may be related to the symptoms of an underlying disease, the uncertainty of diagnosis, and fear of the unknown or unexpected.[1–3] Bronchoscopy-related anxiety may also be due to concerns about physical discomfort caused by the invasive procedure itself. To improve patient comfort and minimize procedure-related psychological and physical trauma, health-care providers describe the risks and benefits of FFB to patients when they obtain their written informed consent; they also administer verbal support, reassurance, and anxiolytic medication during the procedures. Despite the widespread use of FFB, however, little is known about FFB-related anxiety and the effect of antianxiety interventions.

In an attempt to reduce stress, improve patient relaxation, and relieve anxiety in patients undergoing outpatient surgery, dental procedures, invasive endoscopic interventions, and hospitalizations, music has been proposed as a safe and inexpensive nonpharmacologic antianxiety intervention.[4–6] In addition, music has been shown to do the following: (1) reduce the need for sedation during regional anesthesia,[7] (2) help to control pain and anxiety in

*From the Division of Pulmonary and Critical Care Medicine, UCSD Medical Center-Thornton Hospital, La Jolla, CA.
Manuscript received September 30, 1998; revision accepted March 22, 1999.
Correspondence to: Henri G. Colt, MD, Division of Pulmonary and Critical Care Medicine, UCSD Medical Center-Thornton Hospital, 9310 Campus Point Dr, La Jolla, CA 92037-0975

critically ill individuals,[8] and (3) improve patient comfort levels during outpatient bronchoscopy (in at least one prospective randomized trial[9]).

In this study, we determined the effects of music on bronchoscopy-related anxiety by using a generally accepted, well-validated instrument for measuring state and trait anxiety.[10] We hypothesized the following: (1) music would result in lower state anxiety scores in patients listening to music during FFB than in patients not listening to music, and (2) patients listening to music during FFB would require anxiolytic medications less frequently than patients not listening to music during bronchoscopic procedures.

Materials and Methods

Patients

Sixty patients participated in this prospective, randomized, controlled trial, during which time either recorded relaxation music or silence were delivered via headphones to the patients during FFB. All inpatients and outpatients who were referred for diagnostic FFB were eligible to participate. Patients were excluded if they were < 18 years old, if they were unable to give consent, or if they were significantly hearing impaired. Patients were also excluded if they had impaired mental status; if they were unable to speak and understand English well enough, if they needed ICU hospitalization, or if they were receiving known anxiolytic or sedative medications. The study protocol was approved by the institutional ethics committee, and informed consent was obtained in each case.

Random Assignment to Treatment Condition

Using a random-numbers table, a collaborator allocated the patients to either music ("Relax"; Expansion Records; Manchester, UK) or silence. The music tape consisted of piano improvisations performed at a tempo of 60 beats/min. The collaborator maintained a confidential record of assignments and was not otherwise involved in the study. To avoid introducing patient bias when consent to act as a research subject was obtained, we informed the patients that they were participating in a study of bronchoscopy-related anxiety; that they would be wearing headphones throughout the procedure, but they would still be able to communicate with the procedure nurse; and that the bronchoscopist would be unaware of what the patient was hearing through the headphones.

Investigator Blinding to Treatment Condition

To prevent the bronchoscopist from becoming aware of the treatment condition by inadvertently visualizing the cassette, all tapes were color coded. Only the patients, the collaborator providing the randomly assigned treatment condition, and the nurse assisting during the procedure were aware of the treatment condition. To further avoid introducing investigator bias, we instructed patients to avoid discussing their treatment condition and to avoid nonverbal signals that could accidentally divulge the treatment condition to the investigators.

Bronchoscopy

All procedures were performed by one bronchoscopist assisted by an experienced procedure nurse. After applying topical anesthesia (tetracaine, 0.45%, aerosolized) to the patient's nasopharynx and larynx, the nurse inserted the appropriate cassette of music or silence into a portable tape player. The headphones were put on the patient, and the volume level was adjusted. Patient reassurance was provided by specially trained nursing staff before, during, and after each procedure. In each case, the nurses were able to communicate effectively with the patient in spite of the headphones. The FFB was performed using the transnasal route with patients receiving supplemental oxygen through a face mask. Routine administration of sedatives or anxiolytics was avoided, but IV midazolam was administered during FFB if requested by the patient during bronchoscopy, or if deemed necessary by the bronchoscopist to improve patient comfort and tolerance of the procedure. In our institution, most bronchoscopies are performed without premedication other than topical anesthesia.

Measurements

Patient- and procedure-related characteristics were noted to determine comparability between groups. Procedure-related anxiety was measured using the State-Trait Anxiety Inventory (STAI) scale within 1 h before performing FFB.[10] Instructions pertaining to this self-administered questionnaire were provided to each patient by a nurse practitioner specially trained in questionnaire administration. The nurse practitioner was available to answer questions while patients completed their questionnaires.

The STAI scale is composed of 40 self-reported measures of state and trait anxiety. The state anxiety scale (state) consists of 20 questions that determine how the respondents "feel right now." The trait anxiety scale (trait) consists of 20 questions that assess how the respondents "generally feel." Each scale is printed on opposite sides of a single-page test form. The state scale is administered first, followed by the trait scale. For each scale, the respondents circle the number on the test form to the right of each statement that best describes the intensity of their feelings. For the state scale, the choices are (1) not at all, (2) somewhat, (3) moderately so, and (4) very much so. For the trait scale, the responses are (1) almost never, (2) sometimes, (3) often, and (4) almost always. It takes approximately 5 to 20 min to respond to all the items. The patients were told to focus on the period of bronchoscopy only while responding to the state scale questionnaire.

The STAI scale was repeated within 1 h after completing the bronchoscopic examination. The confidentiality of responses was ensured using patient-identification numbers. The nurse practitioner was also blinded to the treatment condition. At the end of the study period, the questionnaires were scored by adding the weighted (1 to 4) scores of each item using the directions and scoring key provided in the *Manual for the State-Trait Inventory (Form Y)*. The scores could vary from a minimum of 20 to a maximum of 80. The scoring of the STAI scale was done by an investigator who had no earlier knowledge of the study protocol, and who was also blinded to other patient-related study data. State and trait anxiety scores of patients undergoing FFB were compared with scores historically reported for surgical patients and normal working adults of similar age and gender.[10]

Statistical Analysis

Demographics and comparability of the treatment and control groups were assessed using the t test for continuous variables and the χ^2 test for categorical variables with the Yates correction for 2×2 comparisons. For interval-level assessments, repeated measures of variance (paired t tests) with two time periods were used to assess differences between pre- and postbronchoscopy STAI scores. Statistical significance was determined at the 0.05 level and confidence intervals (CIs) were set at 95% probability. Power calculations were performed to determine the minimum sample size for a set α (0.05) and SD (set at 10.4, the SD for State Trait Anxiety Inventory-State (STAI-S) scores of working adults). On the basis of our knowledge of the literature and of the STAI scale, we arbitrarily fixed a clinically significant difference in STAI scores at 5. Power calculations determined that a sample size of 60 patients would provide a power coefficient of 0.96.

Results

Thirty participants each were randomly assigned to the treatment (music) and control (no music) groups using a random assignment sequence derived from a table of random numbers. A comparison of demographics and covariant factors of the two groups revealed no significant differences in age, gender, race, inpatient or outpatient status, history of previous bronchoscopy, duration of FFB, indication for FFB, frequency of adverse events, supplemental administration of IV midazolam during the procedure, or baseline pre-FFB state and trait anxiety scores (Table 1).

A comparison of the STAI scores for the study population with published standards of similar age and gender are presented in Table 2. Pre-FFB state anxiety scores of both the treatment and control groups were significantly higher than the scores reported for working adults (difference, 8.2; 95% CI, 4.6 to 11.8; $t = 4.51$; $p < 0.001$), and similar to those reported for surgical patients (difference, −0.1; 95% CI, −4.1 to 4.1; $t = -0.04$; NS). Trait anxiety scores were no different from scores obtained in working adults (difference, 1.8; 95% CI, −1.2 to 4.8; $t = 1.19$; NS), but were significantly lower than the standard reported for surgical patients (difference, −5.8; 95% CI, −9.4 to −2.2; $t = -3.15$; $p < 0.001$).

State anxiety scores obtained before and after FFB are presented in Table 3. There were no statistically significant differences in pre-FFB state anxiety scores between the treatment and control groups (difference, 2.7; 95% CI, −4.0 to 9.5; $t = 0.81$; $p = 0.4$). Overall, state anxiety scores did not decrease significantly after FFB (difference, 0.2; 95% CI, −3.0 to 3.3; $t = 0.11$; $p = 0.9$). In addition, the administration of music did not result in a statistically or clinically significant reduction in state anxiety of the treatment group when compared to the control group (difference, −0.3; 95% CI, −6.7 to 6.1; $t = -0.08$; $p = 0.9$).

Trait anxiety scores before and after FFB are also presented in Table 3. There were no statistically significant differences in pre-FFB trait anxiety scores between the two groups (difference 1.7; 95% CI, −3.9 to 7.4; $t = 0.62$; $p = 0.5$). Overall, trait anxiety in both treatment and control subjects sustained a similar reduction after FFB (difference, −3.0; 95% CI, −4.3 to −1.6; $t = -4.29$; $p < 0.001$). In addition, the administration of music did not result in a statistically or clinically significant reduction in trait anxiety of the treatment group when compared to the control group (difference, 1.3; 95% CI, −1.4 to 4.1; $t = 0.96$; $p = 0.3$).

Six patients (five in the treatment group and one in the control group) received between 1 and 4 mg of midazolam during FFB. A clinically significant reduction in state anxiety (10.8 points) was noted in this small group compared to patients receiving no sedation (−1.4 points; difference, 12.2; 95% CI, 2.1 to 22.4; $t = 2.41$; $p < 0.02$). A reduction in trait anxiety was not observed. Comparative analyses using only the cohort of 54 patients who had not received anxiolytic medication yielded results that were similar to those obtained using the entire study population; no statistically or clinically significant reductions in state anxiety scores (difference, −1.4; 95% CI, −4.6 to 1.8; $t = -0.8$; $p = 0.4$) were noted, but a statistically significant decrease in trait anxiety scores after FFB was seen (difference, 3.2; 95% CI, 1.7 to 4.7; $t = 4.3$; $p < 0.001$).

Overall, the median baseline trait anxiety score for all of our study patients was 31. To assess potential differences in state anxiety between individuals having either low baseline trait anxiety (< 31) or high baseline trait anxiety (> 31), we stratified patients from each of the treatment and control groups around this median (29 subjects having low baseline

Table 1—*Comparability of Music and Control Groups**

Variables	Music Group (n = 30)	Control Group (n = 30)
Age, yr	49 ± 18†	56 ± 13
Gender, male/female	20/10	19/11
Race, Asian/black/caucasian/Hispanic	1/5/19/5	1/5/18/6
Outpatient	22	19
Inpatient	8	11
Previous FFB, yes/no	17/13	14/16
Duration of FFB, min	17.5 ± 8.5	16.0 ± 7.3
Intravenous sedation, yes/no	5/25	1/29
FFB-related adverse event	3	2
Indication for FFB		
Cough	11	9
Dyspnea	2	4
Pulmonary infiltrates	6	6
Lung mass	5	7
Hemoptysis	2	0
Airway stent evaluation	4	4
Baseline pre-FFB Anxiety		
State anxiety	44.0 ± 12.4	41.2 ± 13.7
Trait anxiety	36.4 ± 11.3	34.7 ± 10.4

*Data are expressed as mean ± SD or No.

†No statistical significance for all comparisons between groups.

Table 2—*Comparison of Subjects to Standard STAI Scales**

Variables	State Anxiety	Trait Anxiety
Reference standards adjusted for age and sex		
Surgical patients	42.7 ± 13.8	41.3 ± 12.6
Working adults	34.4 ± 10.0	33.7 ± 8.7
Pre-FFB all subjects	42.6 ± 13.0	35.5 ± 10.8
Difference subject-surgical	−0.1 (−4.3 to 4.1) NS	−5.8 (−9.4 to −2.2) $p < 0.001$
Difference subject-working adults	8.2 (4.6 to 11.8) $p < 0.001$	1.8 (−1.2 to 4.8) NS
Post-FFB all subjects	42.8 ± 12.7	32.6 ± 10.3
Difference subject-surgical	0.1 (−4.0 to 4.2) NS	−8.8 (−12.3 to −5.3) $p < 0.001$
Difference subject-working adults	8.4 (4.9 to 11.8) $p < 0.001$	−1.2 (−4.0 to 1.7) NS

*Data are expressed as mean ± SD or No. (95% CI).

trait anxiety scores and 31 subjects having high baseline trait anxiety scores). We found no statistically significant differences between the two groups (Table 4).

Discussion

It is generally believed that the administration of music improves patient comfort and favorably affects potential physiologic indicators of anxiety such as heart rate or BP.[11,12] In fact, the benefits of music therapy have been demonstrated in patients undergoing arthroscopy, dental procedures, elective surgery under local or regional anesthesia, cardiac catheterization, other imaging studies, and flexible sigmoidoscopy.[6,7,13–18] Because many believe that it enhances patient relaxation and decreases procedure-related stress, music "therapy" has been advocated in patient holding areas, in recovery suites, and during surgical interventions.[19–21]

Results from studies of music therapy on procedure-related anxiety, however, are not readily generalizable. The conclusions of many investigators are weakened by the following: (1) the absence of investigator blinding, (2) the concomitant use of anxiolytic or sedative medications, (3) the presence of confounding variables, (4) the absence of a well-validated measure of anxiety, and (5) frequent reference to patient perceptions of a procedure or difficult-to-control physiologic variables.

We chose, therefore, a randomized, investigator-blinded study design that required the use of the STAI scale as the principle measure of procedure-related anxiety. Although some question its generalizability,[22] this questionnaire is a widely used, self-reporting measure of anxiety that has been extensively employed in clinical research and practice.[23–25] Designed to assess anxiety as an emotional state, the STAI is written at a sixth-grade comprehension level. Its score is based on a sum of weighted

Table 3—*Mean State and Trait Anxiety Scores Before and After Bronchoscopy**

Variables	Music Group	Control Group	All Subjects	Difference Music-Controls
State anxiety				
Pre-FFB	43.9 ± 12.4	41.2 ± 13.7	42.6 ± 13.0	2.7 (−4.0 to 9.5) NS
Post-FFB	44.0 ± 10.3	41.5 ± 14.8	42.7 ± 12.7	2.5 (−4.1 to 9.1) NS
Post-Pre difference	0.0 (−3.7 to 3.8) NS	0.3 (−5.0 to 5.6) NS	0.2 (−3.0 to 3.3) NS	−0.3 (−6.7 to 6.1) NS
Trait anxiety				
Pre-FFB	36.4 ± 11.3	34.7 ± 10.4	35.5 ± 10.8	1.7 (−3.9 to 7.4) NS
Post-FFB	34.1 ± 11.6	31.0 ± 8.7	32.5 ± 10.3	3.1 (−2.3 to 8.4) NS
Post-Pre difference	−2.3 (−4.2 to −0.4) $p = 0.02$	−3.6 (−5.7 to −1.5) $p = 0.002$	−3.0 (−4.3 to −1.6) $p < 0.001$	1.3 (−1.4 to 4.1) NS

*Data are expressed as mean ± SD or No. (95% CI).

Table 4—*State Anxiety Scores Stratified by High and Low Trait Anxiety (Using the Median Trait Anxiety Score of 31)**

State Anxiety for STAI-trait < 31	Music Group	Control Group	All Subjects
No. of patients	13	16	29
Pre-FFB	37.4	41.6	39.7
Post-FFB	41.8	42.3	42.1
Post-pre difference	4.5 (−2.8 to 11.8) NS	0.8 (−8.0 to 9.5) NS	2.4 (−3.1 to 7.9) NS
State-anxiety for STAI-trait > 31			
No. of patients	17	14	31
Pre-FFB	49.0	40.9	45.3
Post-FFB	45.6	40.6	43.4
Post-pre difference	−3.4 (−6.9 to 0.2) NS	−0.2 (−7.0 to 6.6) NS	−1.9 (−5.4 to 1.5) NS

*Data are expressed as mean or mean (95% CI), unless otherwise indicated.

responses ranging from a minimum score of 20 to a maximum score of 80, with a score of 80 representing the highest levels of anxiety. State anxiety is believed to be a transitory emotional state that varies in intensity and fluctuates over time.[26] Trait anxiety, on the other hand, is believed to be a personality disposition that remains stable over time and, therefore, should not be influenced by situational stress.

We measured anxiety immediately before and within 1 h after FFB, and we did not note a clinically or statistically significant reduction in state anxiety scores. It is unclear why patients, despite having state anxiety scores greater than those of healthy working adults, did not have reduced scores after FFB. Because our study was based on the use of a questionnaire, we did not attempt to measure levels of anxiety during the procedure itself. Such anxiety, potentially manifested by tightening of the jaw muscles, wrinkling of the forehead, or verbal communications of dismay, could have been forgotten by patients after the procedure, or was perhaps relieved by the reassurance provided to patients by the bronchoscopy staff. We took great care in providing patients with clear instructions regarding the state-trait anxiety questionnaire by asking them within 1 h of the procedure to address procedure-related anxiety. Of course, potential factors contributing toward FFB-related anxiety, such as fear of diagnosis or severity of underlying pulmonary symptoms, may actually outweigh the anxieties prompted by the procedure itself. In our patients, the results of bronchoscopy were shared with the patient before discharge from the procedure area and after the STAI questionnaire had been completed. The maintenance of high levels of state anxiety, therefore, may also have been due to the uncertainty of outcome of the procedure at the time the post-FFB state anxiety measure was taken.

Music did not have a favorable effect on state anxiety scores, even though the treatment group included five patients who had received anxiolytic medication. This subgroup had demonstrably reduced state anxiety scores. In fact, all six patients receiving IV midazolam demonstrated clinically significant reductions in state anxiety compared to patients who did not receive medication. It is comforting to note that anxiolysis is in fact achieved with this anxiolytic!

Recent studies[9,21] suggest that physicians and procedure assistants are surprisingly incapable of accurately judging by observation alone the subjective experiences of a patient undergoing an invasive procedure. In our study, the bronchoscopist was entirely blinded to the treatment condition. Premedication was administered only if patients seemed to poorly tolerate the procedure (as shown by excessive movement or coughing) or if they requested medication during FFB. Music did not reduce the need for anxiolytic medication. Perhaps delivering music through headphones promoted anxiety so that anxiolytics were warranted in some patients. Great care, however, was taken to ascertain patient comfort with the headphones, regardless of whether the patient was hearing music or silence; effective communication was always ensured between the procedure staff and the patient. During the entire study, none of the patients in either group requested that their headphones be removed.

It is also possible that personal preferences need to be considered when selecting music for patients. To do this, however, would have substantially increased the number of subjects required for the study; in addition, it could have changed the focus of the trial to addressing what type of music is effective, rather than answering the more straightforward question of whether or not music reduces FFB-related state anxiety. Our results prompt us to suggest that such a study is unnecessary; if music is desired, it should be provided in waiting rooms or procedure suites in an attempt to "soften" the atmosphere for both patients and staff, not because it is a questionably effective anxiolytic intervention. In this respect, a recent study[27] of ambience music in the GI endoscopy suite showed no effect on anxiety levels.

Results from our study add weight to the previously stated argument[28,29] that changes in state anxiety do not depend on whether individuals have high or low trait anxiety. To address this issue, we stratified patients around the median trait anxiety score to classify patients as having either high or low trait anxiety (Table 4). No statistically significant differences were noted between groups, and no differences were noted after removing the six patients who had received anxiolytic medication from the analysis (data not presented).

We were intrigued by our finding that trait anxiety scores decreased after FFB, although they were not favorably affected by music either. This unexpected reduction can be attributed to a test-taking artifact that results from simply taking the trait anxiety scale a second time. This effect was observed many years ago by Charles Windle with the Taylor Manifest Anxiety Scale, and has been known as the "Windle Effect" (Charles Spielberger, PhD.; Professor Emeritus; November 1998; personal communication).

In conclusion, bronchoscopists should not assume that because patients are quiet, they are not anxious. In fact, if anxiolysis is desired, it can be effectively provided through the supplemental administration of IV medication. Providing patients with music during a flexible bronchoscopy cannot replace a well-intentioned, competent, and attentive procedure staff. Although music may be relaxing and delightful, this "universal language" does not reduce bronchoscopy-related anxiety.

References

1 Johnson JE, Morrissey JF, Leventhal H. Psychological preparation for an endoscopic examination. Gastrointest Endosc 1973; 19:180–181
2 Simons RJ, Baily RG, Zelis R, et al. The physiologic and psychological effects of the bedside presentation. N Engl J Med 1989; 321:1273–1275
3 Smoller JW, Pollack MH, Otto MW, et al. Panic anxiety, dyspnea, and respiratory disease: theoretical and clinical considerations. Am Rev Respir Crit Care Med 1996; 154:6–17
4 Corah NL, Gale EN, Pace LF, et al. Relaxation and musical programming as means of reducing psychological stress during dental procedures. J Am Dent Assoc 1981; 103:232–234
5 Elliott D. The effects of music and muscle relaxation on patient anxiety in a coronary care unit. Heart Lung 1994; 23:27–35
6 Evans MM, Rubio PA. Music: a diversionary therapy. Todays OR Nurse 1994; 16:17–22
7 Walter-Larsen S, Diemar V, Valentin N. Music during regional anesthesia: a reduced need of sedatives. Reg Anesth 1988; 13:69–71
8 Henry LL. Music therapy: a nursing intervention for the control of pain and anxiety in the ICU; a review of the research literature. Dimens Crit Care Nurs 1995; 14:295–304
9 Dubois JM, Bartter T, Pratter MR. Music improves patient comfort level during outpatient bronchoscopy. Chest 1995; 108:129–130
10 Speilberger CD. Manual for the state-trait anxiety inventory (form Y). Palo Alto, CA: Consulting Psychologists Press, 1987
11 Augustin P, Hains AA. Effect of music on ambulatory surgery patients' preoperative anxiety. AORN J 1996; 63:753–758
12 Winter MO, Paskin S, Baker T. Music reduces stress and anxiety of patients in the surgical holding area. J Post Anesth Nurs 1994; 9:340–343
13 Bolwerk CAL. The effects of relaxing music on state anxiety in myocardial infarction patients. Heart Lung 1987; 16:331
14 Frandson JL. Music is a valuable anxiolytic during local and regional anesthesia. Nurse Anesth 1990; 1:181–182
15 Slifer KJ, Penn-Jones K, Cataldo MF, et al. Music enhances patients' comfort during MR imaging. Am J Roentgenol 1991; 156:403
16 Standley JM. Music research in medical/dental treatment: meta-analysis and clinical applications. J Music Ther 1986; 23:56–122
17 Stevens K. Patients' perception of music during surgery. J Adv Nurs 1990; 15:1045–1051
18 Palakanis KC, DeNobile JW, Sweeney WB, et. al. Effect of music therapy on state anxiety in patients undergoing flexible sigmoidoscopy. Dis Colon Rectum 1994; 37:478–481
19 Barnason S, Zimmerman L, Nieveen J. The effects of music interventions on anxiety in the patient after coronary artery bypass grafting. Heart Lung 1995; 24:124–132
20 Cirina CL. Effects of sedative music on patient preoperative anxiety. Today's OR Nurse 1994; 16:15–18
21 Daub D, Kirschner-Hermanns R. Reduction of preoperative anxiety: music as an alternative to pharmacotherapy. Anaesthesist 1988; 37:594–597
22 Tenenbaum G, Furst D, Weingarten G. A statistical reevaluation of the STAI anxiety questionnaire. J Clin Psychol 1985; 41:239–244
23 Auerbach SM. Trait-State anxiety and adjustment to surgery. J Consult Clin Psychol 1973; 40:264–271
24 Kendall PC, Finch AJ, Auerbach SM, et al. The state-trait inventory: a systematic evaluation. J Consult Clin Psychol 1976; 44:406–412
25 Kendall PC, Williams L, Pechacek TF, et al. Cognitive-behavioral and patient education interventions in cardiac catheterization procedures: the Palo Alto Medical Psychology Project. J Consult Clin Psychol 1979; 1:49–58
26 Martinex-Urrutia A. Anxiety and pain in surgical patients. J Consult Clin Psychol 1975; 43:437–442
27 Stermer E, Levy N, Beny A, et al. Ambience in the endoscopy room has little effect on patients. J Clin Gastroenterol 1998; 26:256–258
28 Spielberger CD, Auerbach SM, Wadsworth AP, et al. Emotional reactions to surgery. J Consult Clin Psychol 1973; 40:33–38
29 Shipley RH, Butt JH, Horwitz B, et al. Preparation for a stressful medical procedure: effect of amount of stimulus preexposure and coping style. J Consult Clin Psychol 1978; 46:499–507