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A Pilot Study of Patients in Postoperative Cardiac Surgery

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A broadcast music system has evolved at Piedmont Hospital in Atlanta, Georgia, that brings music into the intensive care units (ICUs), operating rooms, perioperative areas, gastrointestinal lab, and labor and delivery. A number of years ago, Piedmont Hospital extended its 10-channel music system to the open-heart ICU area, and a pilot study using headphone music was done on a convenience sample of 67 patients admitted to this particular ICU area who recovered from coronary artery bypass graft surgery (without valve repair). Patients receiving the treatment (music) spent significantly less time in the ICU (1,357 minutes vs. 1,657 minutes, $F = 4.29$, $p = .02$). There was a trend for lower sedative charges and ICU charges, but these were not significant. The financial cost of incorporating music in the care of cardiac and cardiac surgery ICU patients is relatively small compared to the potential economic benefits.

Keywords: cardiology; intensive care unit; cardiac surgery; music medicine

Some of my first experiences as an anesthesiologist implementing recorded music for patients requiring surgery began many years ago at Piedmont Hospital in Atlanta, Georgia. Initially, I used a portable cassette tape player to provide music for patients in the operating room. I found that music made the management of patients undergoing sedation or general anesthesia easier. The patients undergoing general anesthesia had a more peaceful induction to sleep, and there was less agitation upon emergence. Patients who were sedated needed lower doses of sedatives to reach a deep level. The music seemed to camouflage some of the normal background noise in the operating room, and as a result staff members became more able to focus attention on their patients. The patients who were given general anesthetics had a smoother hemodynamic and psychological anesthetic induction and emergence. This article presents the results of a pilot study that served as a clinical investigation of the effects of music in cardiac recovery.

Through selection of specific music tailored to the mood and circumstance of treatment, when I first implemented music the hospital setting, I was able to observe subtle changes in how surgeons managed their care of patients. It also made the management of the surgeons easier in that I could choose music that seemed to affect their moods and performance (Allen & Bascoviich, 1994). It was clear that the most effective music choices had meaning for the patients and often facilitated a connection with previous listening experiences that elicited positive associations. Music encouraged patients to use their ability to access and resource emotions of security and familiarity. In connecting with a past music-listening experience, they were provided with a sense of safety and comfort, and this reduced the vulnerability and stress response that typically accompanies patients undergoing surgery. It became important in the development and understanding of our implementation of music to have evidence of the effect that music could provide for our patients. The following study, conducted with Gene A. Ramey, BSN, RN, and Sarah Pawli, RNl, CCRN, investigates the effects of music on ICU postoperative recovery.

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Implementation: Setting

A number of years ago, Piedmont Hospital extended the 10-channel music system developed by the author into an open-heart ICU area (see Table 1). Headphone units were installed in only 5 beds of a 10-bed area. Full installation for all 10 beds was to occur after the study was completed.

Sample

After approval from the institutional review board, data were collected on a convenience sample of 67 patients admitted to this particular ICU area who were recovering from coronary artery bypass graft (CABG) surgery (without valve repair).

Design

The patients were assigned by the ICU nurses to their particular beds based on availability of space. In this respect, the two groups were as randomly chosen as possible, given the considerations of a busy open-heart-surgery service. Upon arrival to the ICU from the operating room, headphones were put on each patient in the music group. None of the patients were awake enough to give a music preference. The patients were all initially exposed to the light piano music channel (Table 2).

This light piano channel is the most popular channel for patients over 45 years of age at our institution, and it was felt that very few patients would find this type of music objectionable. The music was initially administered at a low to moderate volume and was selected by the nurses until the patients were able to do so themselves. Almost all of these patients were still asleep from the anesthesia, and their breathing was controlled via ventilator. As soon as each patient was awake enough to communicate, he or she was asked about the music that was playing and was given the option of listening to any of the nine other channels. If the patient did not want to listen to music, the headphones were removed. The patient and nurses decided on the duration of listening time in each case during the stay in the ICU. The average length of music listening on the first day in the ICU was 259 minutes ($SD = 223$ minutes), and the average number of music sessions was 2.3.

Table 1. Piedmont Hospital Music Channels

1	Vocal Popular
2	New Age
3	Light Piano
4	Rock & Roll (Contemporary)
5	Classical
6	Gospel
7	Jazz
8	Country
9	Soothing Soundtracks
10	Rock & Roll (Classic)

Table 2. Light Piano Channel Selections

1	George Shearing	"Grand Piano"
2	David Benoit	"Waiting for Spring"
3	Danny Wright	"Black and White"
4	Danny Wright	"Encore"

Instruments

The nurses were trained in using the music system and in recording the data using data collection sheets. A researcher blind to the study compiled additional data from the medical records. The following variables were collected by the nurses and from the hospital charts: (a) length of music listening on the day of surgery, (b) total length of music listening in the ICU, (c) time spent on ventilator prior to extubation, (d) length of ICU stay, (e) age of patient, (f) sex of patient, and (g) incidence of myocardial infarction (MI) prior to surgery. Financial data from the hospital was collected to provide the following variables: (h) total hospital charges, (i) hospital charges for ICU care, and the subsets of (j) respiratory therapy charges and (k) pharmacy charges for sedative and analgesic drugs during the ICU stay.

Demographics

All dependent variables—time spent on the ventilator, minutes spent in the ICU, ICU charges, sedative charges, respiratory charges, and total hospital charges—were examined for normality. Minutes spent in the ICU and sedative charges were found to be moderately positively skewed, and a square root transformation was conducted. Respiratory charges, ICU charges, and total hospital charges were found to have substantial positive skewness, and a log transformation was conducted. Time spent on the

Table 3. Demographics of the Sample

	Control Group ($n = 32$)		Music Group ($n = 35$)		Total ($N = 67$)	
	n	%	*n*	%	*n*	%
Gender						
Male	25	78.1	23	65.7	48	71.6
Female	7	21.9	12	34.3	19	28.4
Preoperative myocardial infarction						
Yes	7	21.9	16	45.7	23	34.3
No	25	78.1	19	54.3	44	65.7

Table 4. Means and Standard Deviations of Variables of Interest

	Music		Control		Preoperative Myocardial Infarction		No Preoperative Myocardial Infarction	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Time								
On ventilator (in minutes)	261.49	133.77	270.03	110.21	277.70	139.38	259.23	113.46
In intensive care unit (ICU; in minutes)	1,357	435	1,657	950	1,722	944	1,384	582
In ICU (square root transformation)	36.42	5.57	39.52	9.89	40.27	10.24	36.66	6.37
Charges								
Hospital (in dollars)	14,217	3,462	13,832	3,389	14,863	4,270	13,599	2,815
Hospital (log transformation)	4.14	0.10	4.13	0.10	4.16	0.12	4.13	0.09
ICU (in dollars)	3,911	1,566	4,365	2,632	5,016	2,962	3,664	1,371
ICU (log transformation)	3.56	0.16	3.59	0.20	3.64	0.23	3.54	0.14
Sedative (in dollars)	29.17	47.29	34.62	51.39	39.61	66.21	27.68	37.29
Sedative (square root transformation)	4.13	3.53	4.71	3.58	4.80	4.17	4.08	3.09
Respiratory (in dollars)	600.94	421.21	499.06	263.73	648.78	482.25	501.84	260.55
Respiratory (log transformation)	2.70	0.26	2.65	0.22	2.72	0.28	2.65	0.22

ventilator was normally distributed and did not require transformation. After the transformations, five cases remained as outliers in one or more of the dependent variables and were removed. Data from the remaining 67 patients were used in the analysis.

The ages of the members of the control group ranged from 47 to 86 years, with a mean of 64.75 ($SD = 10.55$). The ages of the members of the music group ranged from 44 to 84 years, with a mean of 63.49 ($SD = 10.60$). A chi-square analysis ($\chi^2 = 4.21$, $p = .04$) revealed a significantly higher incidence of preoperative MI in the music group (45.7%) than in the control group (21.9%). Since the music system was to become a part of routine postoperative cardiac care, the music system was initiated in just half of the existing beds while the study was conducted. (See Table 3 for sample demographics.)

Analysis

Two sets of variables were analyzed using a 2×2 multivariate analysis of variance (MANOVA). The two factors were group (control group with no music and experimental group with music) and presence of heart attack before surgery (yes or no). Table 4 presents the mean and standard deviations of each variable before and after transformation.

The results of the MANOVA for charges (total hospital charges, ICU charges, sedative charges, and respiratory charges) found no significant interaction ($F = 1.56$, $p = .20$) or main effect for treatment ($F = 1.60$, $p = .19$) or preoperative MI ($F = 2.44$, $p = .06$). The results of the MANOVA for time (minutes spent on the ventilator and minutes spent in the ICU) found no significant interaction ($F = 2.68$, $p = .08$) but did find significant main effects for

treatment ($F = 4.29$, $p = .02$) and preoperative MI ($F = 3.99$, $p = .02$).

Results

Patients receiving the treatment (music) spent significantly less time in the ICU (1,357 minutes vs. 1,657 minutes, $F = 4.29$, $p = .02$). There was a trend for lower sedative charges and ICU charges, but these were not significant.

Discussion

Listening to headphone music shortened the average amount of time the CABG patients spent in the ICU postoperatively by more than 5 hours. Despite some favorable trends, the other variables of interest were not significantly different between the two groups of patients. It is possible that a larger sample size would have shown significant cost or other benefits to the music group. A number of factors may have decreased the potential benefits of the music. In this study, the patients were not given any preparation or instruction before surgery. They were not able to choose their preferred music channel until they were awake after surgery. They also were not granted the opportunity to select music before or during surgery. When music is played throughout the entire perioperative period, it has been shown to decrease the stress response by lowering the blood levels of neuroendocrine stress hormones (Oyama, Sato, Kudo, Spintge, & Droh, 1987; Spintge & Droh, 1988). It is quite possible that the benefits of the music would have increased if the music were available during the entire perioperative time period.

A replication of this study could possibly show more effectiveness if a music therapist or other health care professional could assess psychosocial variables and introduce the patients to the concept of music for cardiac surgery. Helping patients choose their preferences before surgery and administering live music, entrained to the heartbeat, might prove to be clinically significant. This would very likely be more therapeutic than the peripheral involvement of a busy ICU nurse administering the music while he or she has other critical patient care responsibilities.

The study of music with heart patients in the ICU is inherently difficult. Many of the effects are subtle and difficult to measure, and it often takes large patient populations to show significant results. Meta-analysis can magnify the power of individual studies for stronger statistical results. A Cochrane study is currently under way that will collectively look at studies on using music with heart disease (Bradt & Dileo, 2007).

Summary

Music in the ICU allows a deeper emotional connection with our patients and can open a dialogue between despair, hope, and acceptance. The financial cost of utilizing music with ICU patients is relatively small compared to the potential economic benefits.

Music is currently being used with other modalities of stress reduction in the care of the ICU patient in a number of institutions (Kreitzer & Snyder, 2002; Kshettry, Carole, Henly, Sendelbach, & Kummer, 2006; Montgomery, David, Winkel, Silverstein, & Bovbjerg, 2002; Tusek, Cwynar & Cosgrove, 1999; Whitworth, Burkhardt & Oz, 1998). Some of these potentially useful therapies are guided imagery, hypnosis, massage, and therapeutic touch. In an era of rapidly increasing technological innovation in the care of the ICU patient, it is a challenge for health care systems to humanize the care of these patients. In opening our own hearts to our patients, we can become more fulfilled and, as a result, will become more effective health care providers.

Declaration of Conflicting Interests

The author has declared that there are no conflicts of interests in the authorship and publication of this contribution.

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