

**A Pilot Project to Determine Whether Using Music in the PACU Improves Recovery
Time and Patient Satisfaction**

by

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ABSTRACT

Purpose: To examine the ability of patient-selected music to reduce pain perception, decrease post-anesthesia care unit (PACU) time, and improve patient satisfaction relative to usual ambient noise.

Design: Patients presenting for emergent surgery at a Midwestern community hospital (n=38) received music in one of five genres they selected via headphones within 5 min of PACU arrival. Control patients (n=39) had surgery as usual during the same 12 month period.

Methods: Outcomes included PACU time, medication use, pain scores, and patient satisfaction via standardized questionnaire.

Findings: Patients receiving music had shorter recovery times (43 versus 52 min, $p=.012$) and a trend for decreased pain medication requirements (31.6% versus 48.7%, $p=.096$). Patient satisfaction improved for all PACU patients (87% positive in quarter of study versus 61% in quarter before). Satisfaction of music patients was uniformly positive.

Conclusions: Music is a low-cost, non-invasive nursing intervention that may facilitate patient recovery in the PACU.

Keywords: Patient-selected music; Nursing intervention; PACU; Music therapy

Music may be used to uplift, soothe, and distract individuals in many settings, leading to decreased sympathetic activity¹ and endorphin release.² Surgical patients face multiple unfamiliar stimuli in the often hectic PACU setting. The PACU consists of a large room with curtains separating patient areas to provide privacy and mask the continual monitoring and frequent arrivals and departures of other patients. Post-operative patients often awaken to these extraneous noises and unseen activities with heightened sensitivity accompanied with increased cortisol levels that increase perception of pain and anxiety.³ This frequently results in an increasing need for pain medication that may cause nausea or drowsiness, subsequently contributing to extending the stays of patients in PACU.⁴⁻⁷

Some studies have shown music to have beneficial effects as an adjunctive intervention in postoperative patients through decreasing post-operative anxiety,^{1, 8-10} systolic blood pressure,⁵ pain,^{5, 10-12} and analgesia requirements,^{1,4} increasing relaxation,^{9, 12, 13} and shortening PACU recovery times.^{4, 13} It is postulated that music produces its beneficial effects in the post-surgical setting by masking ambient noise, which may be stressful and disorienting to the patient, and promoting a familiar, pleasant environment.⁶ According to Burns¹⁴ and Villarreal and colleagues,¹⁵ these beneficial effects occur primarily when patients are permitted to make the music selection.

However, music's effects may be modest and they are not found in all studies.^{5, 16} Nevertheless, even a modest benefit produced by a low-cost, nonpharmacological intervention without adverse effects may have a place in the post-surgical setting, particularly if it reduces the risks of respiratory depression and sedation through reducing medication doses.¹⁴

The purpose of this pilot project was to determine whether patient-selected music provided by ear buds in the immediate postoperative period would decrease recovery time, pain medication requirements, and/or improve patient satisfaction. Experimental (music) patients were compared to previously collected data from post-anesthesia care unit (PACU) comparison patients with similar backgrounds, surgeries, age, and gender who heard usual ambient sound.

Local Problem

The length of stay in PACU is important to both PACU staff and administration. The facility is focusing on the need to more efficiently use staff in the PACU while promoting quality and safe patient care, and maintaining positive patient satisfaction. This endeavor stems from an examination of average length of stays in PACU of greater than 90 minutes, potentially requiring additional staff to avoid an overlapping situation unacceptable according to American Society of PeriAnesthesia Nurses (ASPA) standards, which dictate a national patient-to-nurse staff ratio of one nurse to two patients.¹⁷ Maintaining this ratio in the present facility requires patient discharges within 60 minutes providing this will not compromise quality and safety of patient care. The institutional initiative seeking general reduction in PACU recovery time met with mixed success. Although average PACU recovery time decreased to 51.7 minutes per patient, coincidental patient satisfaction scores dropped to 61% from a historical average of 94.0%. Patients reportedly experienced the impression of being rushed through the surgical recovery process; sometimes leading to a misinterpretation of lack of patient care.

The use of music in the PACU has the potential to benefit the unit by reducing patient stays in PACU and lowering analgesia dosing. The majority of stakeholders supported this low-cost, low-risk, nursing intervention. The project was approved by the local Institutional Review Board as well as the site chief nursing officer and PACU supervision before implementation.

Planning the Study of the Intervention

Normal clinical practice dealing with patient anxiety can range from tacit recognition to empathize with the patient to narcotic medications to control anxiety or pain conditions. However, an abundance of research studies pertaining to anxiety relief from music therapy suggests this as a viable adjunct strategy for incorporation into clinical practice. Altering the environment with calming effects can arguably decrease adverse stimulation and may engage positively the autonomic nervous system (involuntary control of regulatory nervous system) during recovery from anesthesia, promoting relaxation to improve the surgical patient's outcome. An important consideration is patient desire to listen to music, as not everyone appreciates music. In such cases, music may cause additional distress and anxiety; hence the reason for patient selection providing the opportunity to decline participation. Only two patients approached to participate in this pilot project declined to listen to music and only one participant requested discontinuation of music in PACU.

The foundation for implementation of this project finds a basis from organizational initiatives to examine alternatives to reduce length of stays in PACU. The music intervention can be administered without change to standard PACU protocol for monitoring, criteria for medication administration, or discharge. A comparison group with similar characteristics of age, gender,

and procedures will be useful as a benchmark comparison. Unique characteristics of each study group are every patient is experiencing emergency surgery and the same PACU caregiver is responsible for recovering the substantial majority of patients in the study. This serves to provide consistency and decrease bias as a single individual interprets specific PACU discharge criteria each patient must meet before discharge.

RESEARCH METHODS

Procedure

This prospective study enrolled a convenience sample of patients undergoing weekend emergency surgery at a mid-Western suburban hospital between April and August, 2014. To be eligible for the study, patients had to be between 18 and 89 years old, English-speaking, and with normal hearing. Informed consent was obtained preoperatively by the author, who is a PACU nurse. After listening to 10-second selections of each choice, patients selected music from one of five pre-recorded genres to be played within 5 minutes of their arrival in the PACU. The music was delivered by a compact disc player through disposable ear buds. After genre selection, participants selected the most comfortable volume for them. Baseline clinical and demographic data were collected. When the participant awakened in the recovery room following surgery, he/she experienced the music via ear buds. Vital signs and medication use were monitored and documented per standard practice. To obtain satisfaction data from music study subjects, the author contacted participants by phone to advise of a forthcoming survey by mail, containing a stamped envelope pre-addressed to a third-party analyst to protect patient

anonymity. The research analyst, who had no other contact with the participants, received and de-identified the surveys before returning them to the author. These steps were to decrease bias and promote reliability of responses. Historic PACU recovery data collected in the year prior to and year of the music intervention, including patients' responses to the identical patient satisfaction questionnaire, were used for data comparison. Study participants were matched to historical controls on the basis of surgery type and age (± 5 years) to provide comparisons of PACU variables. Control patients had emergency surgery from January to April, 2014. All music study participants were cared for by the author, as were 75% of the controls. Patient satisfaction comparisons came from a randomly selected sample of surgical patients from the same institution who completed the survey as part of the hospital's ongoing quality assessment efforts.

Materials and Measures

The music intervention involved delivery of music via CD player with the patient selecting one of the five pre-recorded genres of music (60-80 beats-per-minute rhythm) and comfortable volume of approximately 50% for ear bud delivery. A variety of five music genres with inherent rhythm requirements could be selected including healing, easy listening, hymn, Motown, or classical. Healing selections included pieces entitled Awakening, Ascension, Oneness, Healing Music #1; Easy Listening included Let It Grow, Strange Magic, Ventura Highway, Peaceful Easy Feeling, Fire and Rain, Rock & Roll Lullaby, Nights in White Satin; Hymns included Rock of Ages, What a Friend We have in Jesus, Nothing but the Blood of Jesus, Blessed Assurance, All Hail the Power of Jesus, Just as I am; Motown selections

included Just My Imagination, I'll Be There, What's Going On, I Heard it Through the Grapevine, My Girl, Ain't No Mountain High Enough, You Can't Hurry Love, Baby Love, Reach Out; and Classical selections included The Four Seasons, Sonata #16 in C Major, The Tales of Hoffman, Canon in D Major, Hungarian Dance, Watermusic, String Quintet in E Major, Peer Gynt-Suite 2.

Demographic and surgery characteristics collected from patients' charts included gender, age, surgery type, and weight. Upon admission to the PACU, patients received continual monitoring for heart rate, respiration rate, and blood pressure. Vital signs were documented every five minutes until the patient was extubated; then every 10 minutes until discharge. The PACU in the present community hospital provides close monitoring of patients until they met ASPAN and institutional discharge criteria, which included awakening, maintaining the airway, stable vital signs, and reporting pain at a manageable level of no higher than a 4 of 10 on a visual analog scale (VAS). The VAS used locally describes pain intensity through facial expressions and verbal analogy.¹⁸ These standard criteria allowed for consistency and repeatability across patients. Length of stay in PACU was the time in minutes that the patient remained for close monitoring, beginning upon arrival from the operating room and ending on meeting discharge criteria, when they could be admitted to the hospital or released to return home. In addition to time in PACU, medication administration in the PACU and pain VAS scores were collected.

The basis for quantifying patient satisfaction with surgical services at the institution is a patient satisfaction phone survey of randomly selected patients responding to a standard list of 84 questions. Items included 1) How would you rate the staff on meeting your individual needs?, 2) How would you rate the management of your pain by the staff?, 3) How would you rate the

quality of care?. The average patient satisfaction score immediately prior to implementation of this pilot project was 61%. The project took place at the same time as other quality improvement interventions. At the time of pilot project completion, the average patient satisfaction score increased to 87%.

Statistical Analysis

Baseline demographics, surgery characteristics, PACU time, individual vital signs, and medication use were summarized and music and control patients were compared. Anonymous patient satisfaction data from the same time period were compared to experimental patients who completed and mailed back survey. Categorical data were analyzed using Fisher's exact tests, and continuous data were analyzed using analysis of variance (ANOVA). All tests were performed using SPSS version 18.0 with a two-sided significance level of 0.05.

RESULTS

Thirty-eight patients completed the music intervention and 39 served as controls. There were no significant differences between music and control patients on any demographic or surgery variable. Participants were 65.8% female and aged 45.1 years. For 77.9% of patients, the surgical procedure was gastrointestinal, 11.7% of patients orthopedic, 6.5% of patients genitourinary, and 3.9% of patients gynecological. 26.3% were bariatric patients. All patients received general anesthesia. Pain medication was given to 31.6% of music patients and 48.7% of controls in the PACU ($p=.096$), and non-pain medication was given to 10.5% and 5.1% of

patients in the music and control groups, respectively ($p=.374$). Music participants required significantly less time (43.2 versus 51.7 minutes, $p=.012$) to achieve discharge criteria (See Table 1). During the course of their treatment in the PACU, music study participants commented to the author on the comforting aspect of music, occasionally requesting the music continue until reaching the destination in-patient room. 9.1% of patients were discharged to home and 90.9% were discharged to the floor. Six music patients mailed back the patient satisfaction survey, for a 15.8% return rate. All patients responded that their PACU experience was positive.

Table 1. Demographic and Surgery Characteristics and PACU Experience

<u>Parameter</u>	<u>Music Group</u>	<u>Control Group</u>	<u>P-value</u>
Sample Size	38	39	
Percent Female	63.2%	66.7%	0.467
Age	43.0	47.1	0.267
Weight	82.3	88.3	0.316
Percent Bariatric	28.9%	23.1%	0.372
Surgery Type			0.462
Cystoscopy	7.9%	5.1%	
Diagnostic laparoscopy	26.3%	25.6%	
Dilation & curettage	2.6%	5.1%	
ERCP*	2.6%	2.6%	
I&D* abdominal hematoma	5.3%	0	

I&D* hand	2.6%	5.1%	
I&D* rectal abscess	2.6%	0	
I&D* wrist	2.6%	0	
Inguinal hernia repair	0	5.1%	
Laparotomy	7.9%	2.6%	
Lap* appendectomy	23.7%	15.4%	
Lap* cholecystectomy	7.9%	25.6%	
ORIF* ankle	2.6%	0	
ORIF* hip	2.6%	5.1%	
ORIF* shoulder	2.6%	0	
Sigmoidoscopy	0	2.6%	
Medication Use	31.6%	48.7%	0.096
Non-Pain Medication	10.5%	5.1%	0.374
Time in Minutes	43.2	51.7	0.012
Pain Score	1.8	2.3	0.257

* ERCP- endoscopic retrograde cholangiopancreatogram; I&D-Incision & drainage; Lap-laparoscopic; ORIF-open reduction and internal fixation

DISCUSSION AND IMPLICATIONS

Patients listening to self-selected music within 5 min of arrival in the PACU had significantly shorter times to discharge compared to those without access to music. There was a trend toward reduced pain medication needs, and music patients reported more positive PACU experiences than control patients. Therefore, music appeared to have a beneficial effect as an adjunctive intervention with traditional medicine in this pilot study of a diverse group of patients receiving emergency surgery. Given that music is a low cost, non-invasive, and non-pharmacological therapeutic intervention, the present study supports its implementation by nursing staff. Roy's Adaptation Model⁷ identifies the need for patients to have some control over his or her environment, especially when facing stressful situations such as surgery. Patient-selected music provides patients with a therapeutic tool that decreases external stimuli by providing a distraction, subsequently reducing anxiety and the perception of pain. Implementation of this nursing intervention is possible without a physician's order considering the non-invasive aspect of care.

The present study supports and extends other work on the use of music in hospital settings. Thorgaard and colleagues¹³ conducted the largest study examining music in the PACU setting. This Dutch multicenter study of 325 patients and 91 staff members determined that both patients and staff in the PACU found music played through ceiling speakers at a level that was just audible to be relaxing and pleasant. Although large, the study had some limitations. It contained no control condition and all patients and staff received the same music condition. There was no patient selection of music genre. Finally, there were no objective measures, only self report. Frederiksson and colleagues⁶ conducted a randomized, crossover study in which two groups in the PACU were exposed to three 30-minute long phases: either music--ambient

noise--music or ambient noise--music--ambient noise. Most patients (32/44) preferred music versus ambient sound and patients reported the acoustic environment was “of great importance” for their well being during the music phases of the study. Li and colleagues¹⁰ studied the ability of music to reduce pain in breast cancer patients undergoing radical mastectomy. Patients reported significantly less pain and anxiety with music than those exposed to ambient noise. Likewise, Madson and Silverman⁹ found that music reduced anxiety, pain, and nausea and promoted relaxation in the perioperative environment for patients receiving solid organ transplants. The present study examines a range of patients in the PACU setting and contains both subjective (pain scores and patient satisfaction questionnaires) and objective (e.g., time to meet discharge criteria and pain and non-pain medication administration) measures.

The current study has several strengths. The pilot project design provides consistency relating to nursing care. The author cared for all of the music group and 75% of the control group. All patients were seen for emergency surgery. However, the sample was quite diverse with patients receiving a variety of interventions impacting multiple organ systems and with interventions of different intensities. Because the sample size did not allow differentiation of which patients might achieve the most robust benefits from music, future studies might examine music in a more restricted sample (for example, orthopedic patients differing in complexity of procedure). The music and control patients were matched by age and procedure. They also did not differ significantly in other demographic characteristics such as gender or weight. Finally, both subjective and objective measures and music and control groups were used.

Music was easy for the PACU nurse to apply using disposable ear buds that were gently placed in patients' ears. Many patients quietly awoke from the procedures and readily identified they were in PACU; ready to see their families. One patient was moving to the beat of the music and awoke without pain; ready to go home. An adaptation of this patient selected music project to other areas of an institution may readily be modeled after this PACU pilot project.

Application may presumably be useful in any healthcare setting by either individual or ambient transmission.

Music as a nursing intervention may face barriers in the absence of stakeholder buy-in (French et al., 2012). Although PACU staff is a beneficiary if this project is successful, not everyone is an aficionado of music. A factor that may reduce dissonance is only patients can hear the music. Fortunately, the majority of PACU staff is supportive of music and this project.

Regularly involving the staff by seeking feedback and informing of study developments will likely minimize barriers.

Maintenance of hospital or unit guidelines is necessary for appropriate implementation, as well as indication for use and discontinuation. Other factors such as equipment cleaning and storage should also be in accordance with policy. Disposable ear buds are inexpensive and decrease the risk of nosocomial infections, as these are for one patient use only. Currently the CD players are for use in a controlled environment, decreasing the risk of loss.

Limitations

The study had limitations. The sample size was small, with 38 music and 39 control patients. While this sample size was comparable to many of the published studies, it does not allow efficacy examination in any patient subset and music may have been found to significantly reduce pain medication use if the sample were larger. Though there was some heterogeneity in the patients, the majority presented with gastrointestinal complaints. The study was conducted at a community hospital in the Midwestern United States with large bariatric and orthopedic programs. While there is reason to expect that music would be effective in other settings and in other patient populations, it was not tested in this study. As with several other studies, the effect of music was studied in the PACU setting. The present study extends other studies by using both objective and subjective measures; however, it did not address the ideal timing and duration of music in the surgical setting. That is, music was provided only in the immediate post-operative time period. Other studies might examine whether music might be more effective if begun before and during anesthesia or as the patient continues to heal on the inpatient unit. There was a low response rate (16%) for the patient satisfaction questionnaire in the music patients and the comparator was all PACU patients randomly selected to complete the questionnaire during the year of the study, rather than the control group patients only. While this sample is typically well representative of PACU patients, a direct match to the music participants is elusive. Lastly, other changes were being implemented in the PACU at the same time to improve patient satisfaction. Changes included beginning discharge preparation in physicians' offices, ensuring patients were aware of time constraints before surgery, and developing standard verbiage for nursing staff to discuss expectations of when patients would be transferred between hospital units. While these improvements would be

expected to impact both control and music patients equally, it is worth considering that PACU care was not static during the study period.

Conclusion

Music contributes to a calm, relaxing environment that may promote healing, decrease recovery time in PACU, and improve patient satisfaction. Patient-selected music provides patients some control in a strange environment that helps in adapting to the stressful situation by decreasing anxiety. Although the relatively small sample size of this study limits broader conclusions, results support the use of music to reduce recovery time and improve patient satisfaction scores. There was a trend for reduction in pain medication requirements. This low cost, non-invasive project readily allows for easy implementation into procedural or surgical environments; potentially expanding to inpatient units and emergency departments. Additional research studying the effects of more upbeat music in stimulating sedated patients may prove beneficial.

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Biography

Karen Kautz is a Doctor of Nursing Practice candidate. She is currently an adjunct clinical professor at Marian University, Indianapolis, IN and a PACU nurse at the site hospital.

Conflict of interest: None to report.

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APPENDIX A. STATEMENT OF ORIGINAL WORK

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Established in the Policy are the expectations for original work, rationale for the policy, definition of terms that pertain to academic honesty and original work, and disciplinary consequences of academic dishonesty. Also stated in the Policy is the expectation that learners will follow APA rules for citing another person's ideas or works.

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Learners are expected to be the sole authors of their work and to acknowledge the authorship of others' work through proper citation and reference. Use of another person's ideas, including another learner's, without proper reference or citation constitutes plagiarism and academic dishonesty and is prohibited conduct. (p. 1)

Plagiarism is one example of academic dishonesty. Plagiarism is presenting someone else's ideas or work as your own. Plagiarism also includes copying verbatim or rephrasing ideas without properly acknowledging the source by author, date, and publication medium. (p. 2)

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Statement of Original Work and Signature

I have read, understood, and abided by Capella University's Academic Honesty Policy ([3.01.01](#)) and Research Misconduct Policy ([3.03.06](#)), including the Policy Statements, Rationale, and Definitions.

I attest that this dissertation or capstone project is my own work. Where I have used the ideas or words of others, I have paraphrased, summarized, or used direct quotes following the guidelines set forth in the *APA Publication Manual*.

Learner name and date	Karen Kautz 8/26/2015
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