

# Bach to the Basics: Implementation and Impact of a Postoperative, Inpatient Personalized Music Program for Older Adults

Neema Sharda, MD, Emily Mattoon, BS, Loretta Matters, MSN, RN, Judy Prewitt, DNP, RN, Shelley McDonald, DO, PhD, Richard Sloane, MPH, Christy Cassas, MSN, FNPC, Heidi White, MD, MHS, MEd

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**Purpose:** Music as an intervention to mitigate pain and anxiety has been well studied in the perioperative period. We present a quality improvement (QI) report describing implementation and evaluation of a postoperative, inpatient personalized music program for older adults undergoing elective surgeries.

**Design:** We embedded this program in an existing interdisciplinary perioperative care program, with an outpatient and an inpatient component, at an academic institution.

**Methods:** We describe our initial QI steps, highlight critical lessons learned from this behavioral intervention, and discuss high yield areas to focus on future implementation efforts.

**Findings:** Rapid cycle improvement was an effective method to monitor QI measures. Participants in our program perceived improved mood and pain control, were satisfied with their experience, and had lower rates of incident delirium.

**Conclusions:** This program offers perioperative teams, especially frontline nursing staff, an inexpensive, patient-centered tool to optimize postoperative pain and anxiety. We believe that it can be easily replicated at a variety of hospital systems.

**Keywords:** music implementation, perioperative, delirium prevention, geriatric.

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**MUSIC IS AN INEXPENSIVE,** safe, and well-studied intervention among the geriatric population. Historically, music became an accepted treatment

modality in hospitals through the 19th century and, recently, Dr Oliver Sacks' book *Musicophilia* and the Music and Memory program for people with

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Neema Sharda, MD, Geriatrics Division, Department of Medicine, Duke University School of Medicine, Durham, NC; Emily Mattoon, BS, Geriatrics Division, Department of Medicine, Duke University School of Medicine, Durham, NC; Loretta Matters, MSN, RN, Duke University School of Nursing, and Duke University Hospital, Durham, NC; Judy Prewitt, DNP, RN, Duke University Hospital, Durham, NC; Shelley McDonald, DO, PhD, Geriatrics Division, Department of Medicine, Duke University School of Medicine, Durham, NC; Richard Sloane, MPH, Geriatrics Division, Department of Medicine, Duke University School of Medicine, Durham, NC; Christy Cassas, MSN, FNPC, Geriatrics Division, Department of Medicine, Duke University School of Medicine, and Duke

University Hospital, Durham, NC; and Heidi White, MD, MHS, MEd, Geriatrics Division, Department of Medicine, Duke University School of Medicine, Durham, NC.

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Address correspondence to Neema Sharda, Duke University Medical Center, Box 3003, Durham, NC 27710; e-mail address: [neema.sharda@duke.edu](mailto:neema.sharda@duke.edu).

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dementia in nursing homes brought the power of music to light in popular culture.<sup>1,2</sup> Several studies have explored nonpharmacologic strategies, especially music, to manage perioperative anxiety and pain; a meta-analysis of more than 70 randomized clinical trials demonstrated that music reduces postoperative pain, anxiety, and analgesia use.<sup>3-10</sup> Literature suggests that for this type of intervention to be successful, collaboration with nursing staff is critical.<sup>9,11</sup> A recent study demonstrated that not only is an inpatient music program beneficial, but also implementation is feasible.<sup>12</sup> A review from 2011 describes implementation from the preoperative unit to the operating room<sup>1</sup>; fewer studies describe postoperative music programs.<sup>13</sup> We aim to augment the literature with our experience extending this intervention into the postoperative arena. We present an organizational case study about the implementation of a personalized music program for hospitalized older adults undergoing elective surgical procedures. The purpose of this article was to describe the design, implementation, and preliminary evaluation of a postoperative music program for older adults undergoing elective surgery that can impact clinically significant and measurable quality indicators.

## Methods

### *Program Design*

Project Confusion Avoidance Led by Music (CALM) began as a quality improvement initiative aimed to introduce personalized music as a safe, nonpharmacologic intervention to hospitalized older adults at risk for developing postoperative delirium. The improvement methodology we used to guide our work was rapid cycle improvement (Plan, Do, Study, Act [PDSA]). Our team included stakeholders from the Geriatrics division of an academic institution, including faculty, a geriatric medicine fellow, a nurse practitioner, a medical student, and nursing leadership. We secured funding from institution leadership during a time that our health system was prioritizing delirium prevention. We identified a quality gap in our options for management of postoperative pain and anxiety in older adults, which are two important risk factors for postoperative delirium.<sup>14</sup>

Implementation of the program was expedited by collaboration with an integrated perioperative care

program for older adults.<sup>15</sup> The Perioperative Optimization of Senior Health (POSH) clinic at our institution provided the perfect clinical setting and the quality data that were being collected allowed efficient assessment of our program. In this model, patients are evaluated by an interdisciplinary team preoperatively and followed by the geriatrics team during their postoperative hospitalization. Patients in this program were older than 65 years and had one of the following conditions: prior diagnosis of a cognitive disorder, weight loss greater than 10 pounds in the last year, multimorbidity, polypharmacy (greater than five prescription medications), visual or hearing impairment, or the surgeon perceived an increased risk for surgery or postsurgical recovery. The program protocols and evaluation plan were reviewed and determined to be exempted by the Institutional Review Board. Between September 2016 and March 2017, we approached patients in clinic and educated them about Project CALM. If they agreed to participate, we conducted a music assessment, prepared a music player (iPod shuffle) with a personalized playlist, and delivered the device with headphones (three options—disposable earbuds, disposable over the ear headphones, or reusable over the ear headphones) to the patient on postoperative day 1. On delivery, we encouraged patients to listen to music at least 20 minutes twice daily, but they had autonomy over the ultimate dose and frequency.

A second critical piece for implementation was education of inpatient staff in an attempt to develop buy-in and local champions; based on the current structure in our institution, we targeted four inpatient surgical units. After music player delivery, we sought out the nurse and nursing assistant for the patient, described the benefits of music, and asked staff to advocate for its use. To address concerns about infection control, we informed staff that we clean each device with hospital-approved wipes before delivery.

### *Theory*

A personalized music program requires buy-in from patients, family, nursing staff, leadership, and providers for several reasons. First, this is a behavior intervention for patients who may not be cognitively intact and require support to participate. In addition, this type of intervention is not always traditionally available in the acute care

setting, so the availability of the program must be remembered during everyone's workflow. As we planned implementation of this program, we identified early that championing culture change is particularly important, and this became an area of focus during several rapid improvement cycles.

### ***Multiple Interventions***

Through each iterative PDSA cycle, marked by weekly meetings, we identified critical lessons and adjusted our process to achieve success. First, we found early adopters; we identified multiple groups across our health system that were interested in either nonpharmacologic pain management or bringing music to medicine (eg, an arts and health program, recreation therapy, or stress management services). These individuals and programs became our champions and promoted the program with staff and patients.

Second, we established how to align our program with existing practices to personalize care. After recurring meetings with stakeholders, we learned how they identify and track patients. From this, we established a protocol of placing an image of a musical note on the doors of patients participating in Project CALM; this helped nursing staff engage with appropriate patients about music being part of their treatment plan.

Third, we identified staff and patient education needs; introduction of music to the inpatient arena would require culture change. A knowledge deficit existed with frontline staff regarding the use of music in medicine. To promote our program and the benefits of personalized music among staff, we advertised our program by creating an informational screen saver on computers through the hospital. In addition, we purchased "Project CALM" buttons and headphones. For 2 weeks, a team member rounded on targeted nursing units at various times of day to educate available nurses, nursing assistants, and unit secretaries. We used promotional items as an introduction to discuss the program. In anticipation of nurse and nursing assistant adoption, we provided methods of communication, including a dedicated e-mail address and pager number. We also developed an online module that describes the benefits of personalized music for delirium prevention. This module is currently being used as part of nursing

assistant curricula for career advancement to become a "Geriatric Patient Care Advocate" by our local organization for Nurses Improving Care for Healthsystem Elders. With regards to patient and family education, we evaluated reasons patients declined music and subsequently tailored our approach; for example, we began to educate about the merits of music over watching television.

Fourth, our process involved developing a streamlined course for sustainability and scalability. Initial steps included understanding the optimal workflow in the preoperative clinic. After completion of our pilot, we developed a form that was included with the patients' check-in paperwork. This form provides background information about the benefit of personalized music postoperatively, as well as a music library and space to enter other music preferences, patient name, and date of birth, which replaced the more time intensive personal introduction and music assessment. Now, a nurse informs the patient about this program at check-in, and if desired, the patient completes the form. Subsequently, the form is placed in a secure location. We partnered with Volunteer Services to identify a volunteer to collect forms weekly. The volunteer reviews forms and prepares the music player for patients scheduled for surgery during the following week. The volunteer creates a package with the patient's name, date of surgery, the music device, a set of disposable headphones, and a charger; this is delivered to specified locations on targeted units. The POSH advanced practice provider delivers this package to patients postoperatively. Participating units are aware of the music players and know to return them to a specified location when the patient is discharged. The volunteer retrieves music players from each unit weekly.

### ***Evaluation Measures***

We evaluated several measures to monitor impact. Structural measures included the number of patients approached and the number of patients who did and did not agree to participate. Process measures included the number of music players delivered and survey completion. Quality outcome measures included length of stay, discharge disposition, incidence of delirium, and patient survey responses. Patients who reportedly listened to music

during hospitalization were considered to have “completed” the CALM program; this group was compared with historical POSH patients who did not receive a personalized music intervention. The two groups were compared using the  $\chi^2$  test for categorical data (incidence of delirium and discharge disposition) and the nonparametric Wilcoxon rank sum test for length of stay. Statistical significance was assessed at  $P = .05$ . Delirium International Classification of Diseases (ICD) codes were determined by expert consensus, and these data were provided by performance services.

Survey data were analyzed for associations between specific patient characteristics and reported effect on pain and mood. Given the small sample size, survey responses were grouped to allow for analysis based on dichotomous outcomes. The groups were compared using the  $\chi^2$  test or the Fisher’s exact test depending on the distribution of responses between groups. SAS v9.4 (SAS Institute, Inc, Cary, NC) was used to perform all data analyses.

## Results

During a 7-month implementation period, we approached 126 patients; 109 patients agreed to participate, 57 patients actually received music players (53% of those who agreed), and 45 patients reported listening to music. Figure 1 demonstrates the breakdown of these values by bimonthly increments. Twenty-six of 109 patients (24%) did not receive music players because of same day discharge or having a one-night hospitalization. Fourteen of 109 patients (13%) did not receive music players because their surgery dates were “to be determined” or canceled. The remaining 12 of 109 patients who did not receive music devices were for a variety of reasons such as severe weather, team members out of the office, or surgery dates after our data collection period. Themes as to why patients declined to participate include unsure about pursuing surgery ( $n = 1$ ), feeling overwhelmed ( $n = 1$ ), preferring television ( $n = 5$ ), disliking music ( $n = 5$ ), and having their own source of music ( $n = 4$ ).

Baseline characteristics of POSH patients 45 CALM patients and 157 POSH patients before the availability of CALM were compared (Table 1). Among the CALM patients there was a lower percentage

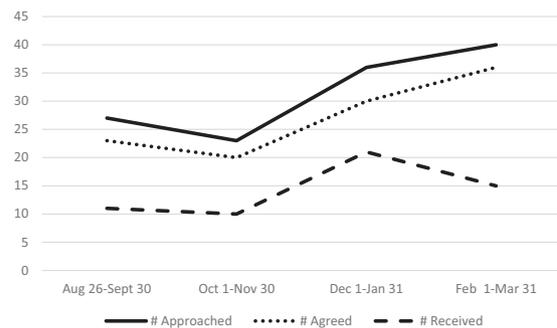


Figure 1. Process measures: number of patients approached, of those approached the number agreed to participate, and the number of patients that received music.

of males (28.9% vs 48.4%) and more patients with some level of cognitive impairment based on the Saint Louis University Mental Status (SLUMS) examination score (81.8% vs 67.5%). SLUMS scores are out of 30 points, with lower scores suggesting more cognitive impairment; if a patient was not a high school graduate, we used a cutoff of 25, and if they did graduate high school, we used a cutoff of 27. There were no other obvious demographic differences between the groups.

CALM patients demonstrated a trend toward lower incident delirium (17.8% vs 28.7%;  $P = .14$ ) compared with the historical comparison group. There was no difference between the groups with regards to length of stay (median of 4.0 vs 4.3;  $P = .18$ ) or discharge disposition (28.9% vs 29.9% discharge to facility;  $P = .76$ ).

Overall, 38 participants completed the postintervention survey; seven participants declined. Of the 38 respondents, 81.1% reported that the CALM intervention had a positive or very positive effect on their mood. Of the 38 respondents, only 31 participants reported experiencing pain. Of these 31 participants, 61.3% reported that the CALM intervention had a moderate or major effect on modulating that pain. In addition, 97.4% reported that they were satisfied or very satisfied with their experience and 89.5% reported that they were likely to continue listening at home as a part of their recovery. There was a wide range of music listening duration. Most patients listened to music for less than 3 hours per day (Figure 2).

**Table 1. Characteristics of Patients**

Baseline Characteristics	Historical POSH Group (n = 157)	CALM Intervention Group (n = 45)	P Value
Age, mean (y)	75.0	74.6	.78
Gender (% male)	48.4	28.9	.02
Marriage status (% married)	54.8	68.9	.09
Cognition (% with some impairment)	67.5	81.8	.07
Depression screen (% positive)	13.5	14.0	.93
Hearing deficit (%)	39.5	40.0	.95
Laparoscopic procedure (%)	22.3	22.2	.99

CALM, Confusion Avoidance Led by Music; POSH, Perioperative Optimization of Senior Health.

Patients who reported that music was a high priority or essential to their life were more likely to report a positive or very positive effect on mood (86.2% vs 55.6%;  $P = .061$ ). No such trend was demonstrated with regards to likelihood of reporting a moderate or major effect on pain (60.9% vs 62.5%;  $P = .32$ ). Patients who screened negatively for depressive symptoms (Koenig Depression Scale less than or equal to 3) were more likely to report a moderate or major effect on pain (68.0% vs 20.0%;  $P = .063$ ); however, there was no trend with regard to how likely they were to report a positive or very positive effect on mood (80.7%; 83.3%  $P = .43$ ). Cognitive status (measured by SLUMS) and hearing impairment did not appear to influence reported effects of the intervention on pain or mood.

## Discussion

An inpatient personalized music program is a feasible, inexpensive, evidence-based intervention that can be implemented with minimal additional

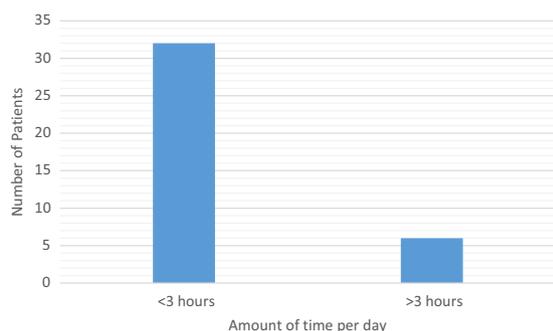


Figure 2. Patient reported daily duration of music listening. This figure is available in color online at [www.jopan.org](http://www.jopan.org).

hospital resources when adequate attention is given to workflow and culture change. Our patient level survey data suggest that patients who listen to music postoperatively benefit with regard to pain perception, mood, and overall satisfaction. Figure 1 demonstrates an increase in the number of patients that agreed to participate over time; we attribute this increase to tailoring our approach when introducing the program. In addition, we observed an increase in the number of music devices delivered during our data collection period. This work demonstrates that personalized music may impact incident delirium; this type of program has system level implications given the clinical consequences and cost of delirium.<sup>16</sup>

## Limitations

There was a significant difference in the overall number who agreed to participate in our program and those who received a music player. We found this was because of the number of same day surgeries, admission and discharge during a weekend, surgeries with dates to be determined, surgeries canceled after their perioperative clinic visit, or surgery dates after our data collection period. Regarding our outcomes reporting, we recognize that our comparison group is from 2013, and there have been many changes in perioperative care in our hospital system over the years. To note, we did not objectively monitor pain because this outcome has been thoroughly researched and supported. However, our hospital leadership was interested in the potential impact on delirium rates, so this was adopted as an outcome that was already being followed in the perioperative program.

### ***Lessons Learned***

For those who want to implement similar programs, we identified high yield areas for focus. Most important is providing education and championing culture change among all those involved with perioperative care. Thought about how to achieve this before implementation is essential. For example, a key challenge for bedside nurses is balancing competing goals of increasing their patients' functional status against managing postoperative pain and anxiety. Framing a personalized music program as an approach to limit medications that may hinder cognitive alertness and threaten safe mobility may be one approach to changing the culture of care. A second important focus area concerns working through how the music intervention can be personalized. Although providing "personalized" music may seem to be a cumbersome task, given generational preferences, we found common genres and artists among patient requests. Implementation may be streamlined with playlist options.

### ***Future Steps***

Given that almost a quarter of patients who agreed to music listening did not receive a device because of short hospitalization, this is an opportunity to empower patients and their families, preoperatively, to include personalized music as part of their personal tool kit. Notably, duration of listening time for greatest impact is not well defined,<sup>1,17</sup> so this is an area to monitor and evaluate different methods of prescription versus individualization. Prescription may be a burden to staff whereas individualization may be problematic for patients with cognitive limitations that impede autonomous use. In addition, evaluation of this type of program based on end user feedback is an important means of guiding PDSA cycle improvements; we found that patients and families often preferred that a team member assists with survey completion, which

can influence responses. More thought should be given as to how to acquire this type of feedback.

Although our intervention was focused on older adults, implementation of an inpatient personalized music program has potential to impact a wider population of patients undergoing elective surgeries. Although this process was developed in a large academic institution, it can be generalized to almost any hospital system with an invested team of champions. Perhaps going forward, a few music preference questions will become part of the workflow during the preoperative anesthesia visits. Music deployment can occur in the postoperative care unit in many formats—individual devices, online music programs, or personal devices brought to the hospital. Depending on the system, volunteer services could be engaged for device retrieval.

### **Conclusions**

Personalized music is an inexpensive intervention that can positively impact clinically important quality indicators. Specifically, a personalized music intervention may decrease the incidence of delirium in complex geriatric patients undergoing elective surgery when used as an adjunct therapy to a comprehensive, interdisciplinary management program. If music is a priority for a patient, they will likely report a benefit from a personalized music intervention regardless of underlying cognitive impairment or hearing deficit. This description of implementation and evaluation provides a road map to embed personalized music more widely as a standard intervention in the postoperative care of older adults.

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