Music in the Operating Room

Music in the surgical environment may be effective in establishing a productive work environment (placing the surgeon and/or staff in an ideal state of mind), and it may help put the patient at ease and in a relaxed mental state. This systematic literature review aims to provide a conceptual and data-driven exploration of the effect of music on pre- and post-operative patients as well as the musical effectiveness of the work performed by surgeons and staff in the operating room.

This article also proposes to review the benefits of music, the role of music in surgical education, and the sources of potential distractions in the operating room (OR). Beneficial effects of music, as measured by the subjective perception of the OR staff (surgeons, nurses, anesthesia providers, surgical technologists) will be discussed.

MUSIC IN THE OPERATING ROOM – DISTRACTION OR IMPROVED PERFORMANCE?

The World Health Organization defines noise as an unwanted sound – noise pollution in the environment is generally considered a stressor, increasing mental confusion, causing hearing loss and the contribution of cerebral cardiovascular disease.¹ Unfortunately, healthcare workers have been exposed to increased noise pollution during the last several decades. Music played in the operating room increases decibel levels, and it may be a source of distraction to communication.

LEARNING OBJECTIVES

▲ Read about whether or not music in the operating room is beneficial to a patient
▲ Evaluate if music played during a procedure can impact the OR team
▲ Compare and contrast the pros and cons of playing music during a surgical procedure
▲ Learn about whether music played during an operation benefits a patient’s heart rate
▲ Analyze the effects and general sources of noises in the OR
In studies evaluated within the research, surveys measured perception and attitude of the OR staff on playing music in the surgical environment. The majority of surgical procedures within the United States had music playing during surgery. Within the study participants, the majority expressed positive comments about music, and in nearly half of the staff surveyed, concentration was subjectively improved, according to surgeons, surgical technologists and anesthesia providers. In addition, participants in the study felt team work improved with music – also music was perceived to reduce stress.

Varying opinions have been expressed on whether music is considered distracting – specifically in critical situations when a problem or critical event occurred during the procedure. There were several studies which indicated feedback from participants who observed a reduction in communication related to auditory speed perception when music was played in the operating room. In one study where observational data was gathered and video recordings were utilized, 37 surgical procedures noted a 52% increase in repeated request rate when music was played. A small percentage of anesthesiologists reported that music in the operating room is associated with communication difficulty, and the anesthesia provider may have challenges in offering a stable level of sedation for the patient.

**ATTITUDE AND STATE OF MIND OF HEALTHCARE PERSONNEL IN TRAINING**

Within the operating room, there are often surgical trainees (residents, medical students, circulating nurses, surgical technologists) who may all be especially vulnerable to distractions. The literature shows that surgical educators and these trainees face consistent pressure to improve efficiency and performance metrics. More research needs to be conducted to determine if some benefit exists in music played for trainee surgeons; there is some evidence of benefit of music for fully trained surgeons.

The research revealed several randomized studies where the effect of music on surgical trainees showed music reduced anxiety in novice-trainee surgeons performing specific tasks such as vascular anastomosis. Items measured to determine the positive effect included video-based evaluation, counted hand-tracking/movements, and time to completion of the task. Additionally, participants in the survey were asked about their opinion on music played while completing the task; the majority reported they enjoyed the music.

Additional randomized studies examined the effect of listening to preferred music on task performance. Da Vinci SI simulators were utilized in studies for 45 medical students, randomized to three training module simulators (one with preferred music, one without music, one with non-preferred music). An interesting result of the study showed that when the medical students performed simulations, first with the preferred music, followed by the non-preferred music, no change in performance was noted. However, when medical students first completed the tasks with the non-preferred music and then followed the same tasks with the preferred music, their performance improved (as measured by time and accuracy on the robot simulator).

Multiple studies across the scholarly journals examined the effect of and attitude towards noise in the OR. In studies where stress-inducing effects of noise were evaluated, nearly 60% stated noise levels were detrimental to efficient communication in the OR. Anesthesia providers specifically stated a negative impact of noise in their clinical reasoning.

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**CONSCIENCE SEDATION AND ANESTHESIOLOGIST REPORT/FEEDBACK: THE EFFECTS OF MUSIC ON PATIENTS; ANXIETY – PREVENTION AND CONTROL**

Multiple studies over the last 20-plus years have examined the effect of music on surgical patients. From 101 articles reviewed, the data showed patients exhibit lower anxiety levels prior to and during surgery when music is played. An added benefit for patients includes a significant reduction in sedation requirements and analgesics. The results show overwhelming positive effects for patients who listen to music of their choice perioperatively; these patients reported less stress, anxiety and reduced pain levels. Musical resources have the power to improve the patient’s condition and recovery with no added expense, and the music
may be customized to each patient. Several studies showed anesthesia providers reported they administered less medication when music was played for patients in procedures where sedation or regional anesthesia was given. Patients in these cases brought their favorite music—played during the procedure where sedation was administered. The anesthesia provider noted in the randomized study of the 60 patients where preferred music was playing that less propofol was given, and following the procedure, patients reported less pain and anxiety. Patient vital signs were monitored in another study, and those who listened to classical music prior to their procedures showed stable respiratory rates, heart rates and normal blood pressure when compared to a control group who listened to no music prior to their procedure.

In the current health environment where opioid use is closely monitored and of concern for doctors and their patients, a meta-analysis in the aforementioned Fu et al study investigated how listening to music during the procedure might influence the patient’s pain medication requirement and length of stay. Healthcare professionals, patients and their families continue to face concerns about the opioid epidemic in the United States; medications used after surgery are known to increase the risk for addiction. The meta-analysis showed in procedures where instrumental or relaxing music was played for patients, the post-operative opioid dose was significantly less. In addition, sedatives used during the procedure were significantly reduced. A consistent theme found across the study results and randomized trials showed music as an inexpensive agent with significant positive effects to patients. Vital signs such as heart rate and blood pressure were improved, and the patient’s overall experience and comfort were positively impacted.

**EPIDEMIOLOGIC METHODS – HEART RATE**

For surgeons and clinical staff, music during surgery was found to reduce blood pressure and heart rate, while also increasing the accuracy of surgical tasks. Multiple studies have been completed to demonstrate the effects of music on surgeons, specifically cardiovascular reactivity. In one study, 100 surgeons were given a basic math task, whereby they were asked to verbally count up by 12s from a 4-digit number for 2 minutes; after 5 minutes, the surgeons were to count up by 15s. This test was repeated under various musical conditions: no music, surgeon’s choice, or classical-Pachelbel’s Canon. The researchers monitored autonomic physiological responses, including pulse rate, blood pressure, and skin conduction; the autonomic responses were lowest in the trials with surgeon’s musical choice, followed by classical-Pachelbel’s Canon, the highest responses with no music.

Music implemented through headphones for patients during surgery would provide the patient with their preferred music and also reduce the noise pollution. Many theorize the music played during surgery would have a calming effect on the patient’s vital signs (blood pressure, heart rate, respiration).

**MUSIC THERAPY - TYPES, EFFECT AND USE OF MUSIC**

Persoon et al published a study where distracting stimuli were tracked in 82 typical urology procedures; distractions were classified as anything that caused general diversion from the main task. Surgeons and staff in this study agreed the most frustrating distractions were unnecessary conversation and door opening. The interesting commonality in this study for both the study and control group is that neither group found music as a distraction. In fact, the common theme among the surgeon group specifically showed the urologists found the music to be a stress-reliever, especially if they chose the music genre.

Patient outcome is affected by the surgeon’s performance and well-being; the effect of music on the surgeon’s mental attitude and mood may generate positive physiological responses. An interesting hypothetical question that arises is does one specific genre of music generate more benefits or adverse reactions than another?

The literature revealed several surveys about the impact of music on operating room personnel. The most commonly reported type of appropriate music in the operating room is the classical type. In one study, 350 healthcare professionals (surgeons, nurses, surgical technologists, anesthesiologists) were questioned about the type of music played in the operating room. The results showed that 80.1% stated music helps them work efficiently and stay calm. Another similar study showed that among clinical staff who listened to music, 68% stated music of their chosen genre increased concentration and focus. Interestingly, in both studies, the respondents did not classify music as a distraction or communication hinderance in the operating room. Another factor tracked in the study found increased speed and accuracy among surgeons who selected their preferred music com-
pared to no music. The research overwhelmingly shows operating room staff found music to be favorable; this may be extrapolated as a positive effect that improves technical performance and relaxation (physiological response).

Some may theorize music may be used as a cue for creating awareness during appropriate situations in the OR; lowering or turning off the music entirely during critical moments draws the attention of entire surgical team. Across the literature reviewed, this practice is standard during the time out portion of the procedure. Furthermore, because surgery may have specific phases with higher demands for all members in the OR involved, music may be prohibited to reduce the likelihood of diverting staff’s attention or encouraging irrelevant conversation or distraction.

**TASK PERFORMANCE – ANALYSIS OF EFFECTS AND GENERAL SOURCES OF DISTRACTION IN THE OPERATING ROOM**

To be fully transparent and inclusive of all sides of the musical effect in the operating room, it should be noted that some researchers have argued the noise of music increases the stress level of the clinical team and degrades communication. Specifically, in neurologic and orthopedic surgeries – where there exists significant equipment noise such as drills, power saws, and suction – the likelihood of repeated communication is much higher (thereby increasing stress levels and possibly adding time to the procedure). Anesthesiologists were questioned, and out of 205 surveys, nearly 71% noted music was routinely played in the operating room, and from this same study, 26% of anesthetists felt communication and attentiveness were compromised. It is interesting to point out that nearly 70% of participants indicated the most distracting music was the genre they did not like; clearly, the music choice in the operating room may be relevant to performance.

An important consideration for the effects of music in the operating room includes the examination of other types of noise and their effect on the surgeon and clinical staff. The research revealed data in several studies which analyzed distractions in the OR. McDermott et al noted the effects of distractions on the stress, workload and teamwork of the surgical staff. To fully disclose all possible effects of music in the operating room, an examination of the research found a study where 15 medical interns performed a laparoscopic appendectomy with a virtual reality simulator. Conditions applied in the simulator included exposure to music and conversation. The simulator results suggest preclinical laparoscope training to reduce irritation for the surgeon, distraction for the clinical staff, and increased safety for the patient.

The nature and complexity of the work in the operating room indicate an underlying focus and effort to provide high quality surgical care. Significant and efficient communication in the operating room contributes to the safety of patient an optimal environment for the surgeon and staff. Music is one aspect of the noise in the operating room, where advanced surgical technology and mechanical sounds may produce noise levels at an unhealthy and hazardous level, increase stress among staff, or impair communication and concentration.

According to the World Health Organization, noise levels in the operating room should not exceed 30 dBA. Prevalence of high noise levels in the OR are likely to exceed these recommended decibel levels – specifically during orthopedic and neurosurgery, where peak levels exceed 95 dBA for significant portions of the procedure.

Excessive noise (of any type) may contribute to communication error when the noise causes impaired understanding of orders and requests. Noise types or stimuli may include cell phones, beepers, radios, speakers, unnecessary conversation among the OR staff and from staff entering the room. There may be a negative impact of noise on clinical reasoning for students or medical residents.

A factor to consider is the complexity of the surgical procedure and the variance in noise levels for some surgeries may be higher (consider drills in orthopedic or neurosurgical cases). Studies show that volume of noise in the operating room may reach deafening levels – even approaching the level of a jet engine.
Further studies and research should explore the finding of higher noise levels during surgery associated with an increased rate of surgical site infections. While higher decibel noise levels may not cause the SSIs, there may be a link between reduced communication efficiency and postoperative complication rate. Medical research indicates patients have an active and receptive auditory cortex during general anesthesia. Therefore, further research may help explain the detrimental effects of high noise levels within the operating room for patients under general anesthesia.

CONCLUSION
As the complexity and duration of surgical procedures increases in the present and future operating rooms, surgeons, medical trainees, anesthesiologists, nurses and surgical technologists are faced with the challenge of balancing the creation of a pleasant work environment and the establishment of safe, distraction free workspace. Music in the operating room may contribute to a calmer, happier surgical team, and music has also been shown to improve patient vital signs, healing and recovery during and after surgery. Much of the research about music in the operating room mentions the concern about the musical addition of sounds to an already noise-polluted environment. The difference here is that music is an optional addition, while most of the other mechanical, technological and conversational noise are necessary.

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ABOUT THE AUTHOR
Kassandra Bahr has been a CST and CSFA for over 16 years since obtaining her associate degree of science in surgical technology. She has been a member of the neurosurgery team at Miami Valley Hospital, the region’s only Level 1 Trauma Center. While employed at the hospital, Kassandra completed her masters and doctorate degrees in business and healthcare administration, and she now splits her time between work as an online professor in the graduate program at Ohio University and serving on PhD committee at Walden University.

REFERENCES
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1. In one study where observational data was gathered and video recordings were utilized, 37 surgical procedures noted a _______.
   A. 52% increase in repeated request rate
   B. 37% increase in repeated request rate
   C. Surgeon dropping more instruments
   D. Medical students repeating surgery rotation

2. In studies where stress-inducing effects of noise were evaluated _______.
   A. 20% stated noise levels were detrimental to efficient communication in the OR
   B. 60% stated noise levels were detrimental to efficient communication in the OR
   C. 12% stated noise levels were detrimental to efficient communication in the OR
   D. 13% stated noise levels were detrimental to efficient communication in the OR

3. True or false: The data showed patients exhibit lower anxiety levels prior to and during surgery when music is played.
   A. True
   B. False

4. Several studies showed anesthesia providers reported they administered less medication when music was played for patients _______.
   A. At very high levels
   B. In cases less than 30 minutes
   C. In procedures where sedation or regional anesthesia is given
   D. Who only liked country music

5. The meta-analysis showed in procedures where instrumental or relaxing music was played for patients, the post-operative opioid dose was significantly _______.
   A. More
   B. About the same
   C. Much higher
   D. Less

6. The common theme among the urologist surgeon group specifically showed they found the music to be/have _______.
   A. A reason to dance
   B. A stress-reliever
   C. Stressful
   D. No effect on skills

7. Among clinical staff who listened to music______.
   A. 68% stated music of their choice increased concentration
   B. 3% stated music should be chosen by the attending surgeon
   C. 12% said the team should vote on the music
   D. 99% stated music of their choice increased concentration

8. According to the World Health Organization, noise levels in the operating room should not exceed _______.
   A. 98 dBA
   B. 30 dBA
   C. 1 dBA
   D. 120 dBA

9. Another factor tracked in the study found _________ among surgeons who selected their preferred music compared to no music.
   A. Reduced speed and accuracy
   B. More mistakes
   C. Less mistakes
   D. Increased speed and accuracy

10. True or false: While higher decibel noise levels may not cause the SSIs, there may be a link between reduced communication efficiency and postoperative complication rate.
    A. True
    B. False

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MUSIC IN THE OPERATING ROOM

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