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# Music's Potential Effects on Surgical Performance

By Ilya Rybkin

Of many life's intangible pleasures, music is perhaps the most beloved and accessible. It transcends language barriers, and in some ways, even the inability to hear, as fans of Beethoven's work can attest to despite; the loss of his noblest faculty. Music has an intrinsic ability to instill serenity in a listener, and has the potential of therapeutic application for a myriad of pathologies, notably described by the late neurologist Oliver Sacks. Music's power of healing has been documented for millennia, and Hippocrates himself was known to rely upon it as an adjunct therapy. It is of no surprise that music's popularity has permeated into the healthcare setting.

The use of music within operating rooms has been not only the source of comedic relief in popular culture, but also controversy, as its ramifications are debated. Proponents for its use preoperatively claim that patients exhibit reduced anxiety and stress levels, and often require less analgesics. Conrad et al report that anxiolytic effects are associated with a decrease in plasma dehydroepiandrosterone, epinephrine, and IL-6 concentrations in patients.<sup>1</sup> Attenuation of the cytokine IL-6, a potent activator of the sympathoadrenal axis, resulted in a reduced mean arterial blood pressure in the experimental group, and a decreased dosage of a sedative to achieve a desired level of sedation. The observed sparing effect of music on intraoperative sedation has been supported by numerous studies.<sup>2-4</sup> Notably, Mozart classical music was played in this study, an inherently soothing genre. It is questionable whether the same effect would be observed if an aggressive style of music were to be played. Despite this caveat, patients undergoing general anesthesia were largely unbothered by musical selection, with 82% of participants in one study indicating that the choice should be left up to the surgeon.<sup>5</sup>

Perhaps of more concern for patient outcome is the effect that music has on the surgeon, who is ultimately responsible for the safety and wellbeing of the individual undergoing the operation. Surgeon-selected music has been shown to improve the speed and accuracy of surgical performance.<sup>6</sup> Interestingly, performance was improved in a cohort listening to operator-selected music as well. Physiologic stress parameters were reduced in both the self-selected and surgeon-selected arms of the study. One study reported that plastic surgery residents performed quicker, and higher quality surgical closures while listening to a preferred music station, as compared with a control non-music group<sup>7</sup>. Hospital operation room fees are on average \$62 per minute,<sup>8</sup> and even a modest decrease in operating time can significantly reduce healthcare costs. Furthermore, reducing patient time under general anesthesia can improve patient outcomes and decrease the incidence of adverse effects, such as postoperative nausea and vomiting,<sup>9</sup> infection,<sup>10</sup> hypothermia,<sup>11</sup> and thromboemboli.<sup>12</sup>

Under certain circumstances, music may impede on the performance of novice and expert surgeons alike, as well as other surgical team members. Anesthesiology providers were more inclined to be distracted by music as compared with surgeons, and loud music in particular was considered disruptive, as anesthesiologists rely on audiovisual alarms during procedures.<sup>5</sup> One study reported that novice surgeons who listened to music that was of a particularly aggressive or upbeat style had worse performance on a laparoscopic task, as compared to participants who listened to soothing music, or no music at all.<sup>13</sup> Investigators studying the effect of activating and inactivating music on expert surgeons observed that classical music increases the accuracy of completing laparoscopic tasks, whereas dichotic music had increased the time to completion, yet had no effect on accuracy.<sup>14</sup>

The contribution of music to operating room noise pollution must also be considered. Certain neurosurgical and orthopedic procedures often result in peak noise levels of 120dB.<sup>15</sup> Contextually, military jet afterburners produce 130dB during takeoff. Noise may disrupt communication among the surgical team, and distract providers during intricate tasks. Furthermore, excessive and chronic noise, prevalent in these surgical subspecialties, can lead to noise induced hearing loss (NIHL) in the surgeons and anesthesiologists, who are positioned closest to the sound source.<sup>16,17</sup> Anesthetized patients are also at risk for NIHL since the stapedius muscles may be paralyzed and subsequently unable to attenuate loud noise spikes.<sup>18</sup> Subsequently, the inclusion of music into the operating room must be decided upon judiciously, and volumes should be kept at a reasonable level in order to reduce the incidence of miscommunication and hearing loss.

Music is inherently highly heterogeneous. Taste is variable, and consideration for others in the OR is not only polite but warranted. Arrival at a consensus can facilitate cohesion among providers, and reduce miscommunication and the fall in vigilance associated with having to listen to unfavorable music.<sup>19</sup> Preference is not always apparent, and age and sex have been associated with a musical proclivity to a greater degree than psychometric personality measures,<sup>5</sup> so simply inquiring is key. Interestingly, one study concluded that over half of surgical respondents preferred to play up-tempo rock in the OR, with only 11% reporting a preference for classical music.<sup>20</sup> Intraoperatively, the patient's input on musical preference is obviated, within reason, if they are under general anesthesia. Many procedures are conducted with local anesthetics, however. As one surgeon mentions: "I will always ask if he or she [the patient] has a preference for music or no music, and if music is desired then I ask if there is a preferred type. If the patient expresses no preference, I simply try to select something soothing."<sup>20</sup>

Music in the operating room has the potential for improved surgical performance, and reduced stress in both the patient (sedative sparing effect) and surgeon. Of course, a multitude of factors must be considered when opting to play music, including but not limited to: the type of genre, the input from the rest of the team, the training level of the surgeon, and the volume. A judgement call must be made as to the appropriateness of music on a case-by-case basis. A well-trained surgeon may benefit from musical stimulation if common sense is employed, and considerations for the surgical team and patient are made.

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