

Editorial

Humming While We Work: Reflections on Music in the Operating Room

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The History of Music in the Operating Room

Humans are musical creatures. In fact, music is a universal language and is one of the oldest languages of human beings. Music has inspired people in all realms of human activities, ranging from worship services to sports to the military. One of the earliest examples of the overlap of music and the healing arts is the identification of Apollo by the ancient Greeks as the father of both music and healing [1]. In a more recent time, about 100 years ago, Dr. Evan Kane, a surgeon in Pennsylvania, noted in a letter to the editor of the Journal of the American Medical Association that music played on a phonograph in the operating room was helpful in helping to calm patients facing and undergoing surgical operations [2]. Today, it is estimated that music is played during about two thirds of the surgical operations performed in the United States each year, and with good reason, as surveys have shown that about 80 percent of operating room personnel say that playing music enhances efficiency and improves the focus of the operative team [3].

I was Born in the Sign of Music

Work hard, rock hard, eat hard, sleep hard, grow big, and wear glasses if you need ‘em [4].

Webb Wilder, Nashville Rocker

Music has played a profound role throughout my life. In fact, I was born in Music City (Nashville, Ten-

nessee) which, for many decades, has been the site of more recording of all music genres, from country to classical to rock, than any other city in the United States. I grew up listening to and singing all sorts of music, from country ballads and hymns with my parents to rock music with my five younger brothers, as well as with many of our pals. I have spent the rest of my life being both energized and calmed by music in a variety of settings.



1949 Ford Coupe.

My first memories of singing were formed in the 1949 Ford coupe that my parents owned when I was a tyke. Those memories were solidified during long drives in the 1961 Plymouth station wagon that my folks eventually bought, as my five younger brothers joined our ever-enlarging family in rather rapid succession. Neither of those two cars had radios in them, so the music had to be ‘provided’ by their occupants. Since the families of my parents lived in South Carolina and Georgia, and we lived in Tennessee and North Carolina for much of my childhood, visiting our relatives for holidays involved long drives on the old US Highways, prior to the creation of the US Interstate Highway system.





My Family of Four Future Surgeons.

To maintain some semblance of peace between the six boys in our family during these long trips, my parents utilized two primary strategies. The first was to sing songs, and the second was what our dad called his ‘hearing aid’, which was a well-worn, one by three inch piece of wooden molding. He kept that instrument on full display on the dashboard of our car during those long drives, noting at the beginning of each trip that, if any of us got too rowdy, he would stop the car and employ that ‘hearing aid’ to regain control of our lively gang. Given the choice between singing songs and enduring the use of that ‘hearing aid’, we chose to sing.



The Ryman Auditorium, Nashville, TN.

The songs we sang ranged from church music to country and mountain music. We did have an old radio in the various houses that we lived in while I was grow-

ing up, and a weekly treat was listening to the Grand Ole Opry, which was broadcast live from the Ryman Auditorium [5] in downtown Nashville every Saturday night. Everyone in our family learned and sang those old musical favorites. They were songs that we came to know by heart. I have maintained my love of listening to, singing, or humming along with music ever since those days.

Putting my Humming to Use in a Near Death Experience

A signature event in my appreciation of music occurred many years later when I was in medical school back in Nashville, at Vanderbilt where my father, one of my younger brothers, and I had studied medicine. My father had spent some time during his years of training in Surgery in the military, as was required of most surgeons in training when the wars in Korea and Vietnam were underway. My dad was able to spend that time in the Air Force at a base on Cape Cod in Massachusetts, where he became fascinated with flying. As a benefit of his service in the Air Force, he was able to take flying lessons, and he obtained a variety of pilot licenses. While I myself was not nearly as fond of flying as was my father, I did realize that flying with him, during his very busy years of surgical practice, might be one of the few ways that I would be able to spend some one-on-one time with him. I would, therefore, fly with him occasionally.



My Dad's Plane.

Years later while I was in medical school, when my best friend's wedding was being planned, my dad offered to fly up to Nashville, pick me up, and get

me to my pal's wedding back in South Carolina. I jumped at the chance to skip the two ten-hour drives that would otherwise have been necessary to participate in that wedding. On the flight back to Nashville from that wedding, we found ourselves dodging the thunderstorms that are ubiquitous in the summers of the South. While at first the circuitous route required was a mere inconvenience, we eventually found ourselves caught in one of those thunderstorms, which seemed to throw us up thousands of feet, followed by plummeting back down by reciprocal amounts. While my dad managed to remain poised, I was terrified, thinking that we would surely have a wing torn off or crash into one of the mountains we were flying over. In trying to maintain some degree of composure in the midst of this mayhem, I found myself humming the Fleetwood Mac song, 'Dreams', that was popular at the time [6].

The strategy of humming that particular song allowed me to remain at least somewhat calm, though I suspect that this experience may have permanently rearranged some neural pathways in my brain! I never forgot that experience and later employed some version of that strategy in other trying circumstances, ranging from taking high stakes exams to performing the challenging surgical cases during my training, or that I later helped my surgical residents perform. Recognizing the value of music, especially music that I could hum, listening to music in the operating room became a standard part of my own training and, subsequently, of my becoming a teacher of Surgery for my residents and students. I will, therefore, reflect a bit more on the role of music in the operating room, both for performing surgical operations and for teaching others how to do those operations.

The Pharmacology of Music

The neurophysiology of music has actually been studied. Music can produce measurable increases in the levels of neurotransmitters in the brain, such as serotonin and dopamine, which are known to be both

pleasurable and calming. Furthermore, music also lowers levels of cortisol, a stress response hormone [7], and raises the secretion of growth hormone that will bind to inflammatory cells, resulting in a decrease in the secretion of interleukin-6 [8]. These neurochemical changes are likely useful for the members of operating room teams. Furthermore, music may also benefit the patients themselves by reducing anxiety prior to anesthetic induction and may even enhance postoperative pain control [3].

Managing the Physical Environment of the Operating Room

Every system is perfectly designed to produce the result that it does [9].

W. Edwards Deming, Industrial Engineer and Economist



The Author with Mentors in Operating Rooms.

The operating room environment will have effects on the surgeons and their teams. Everyone who has worked in an operating room focuses on making that environment as comfortable as possible, with attention paid to managing the temperature of the room, wearing comfortable shoes, supplying cooling vests for the team when the room must remain warm, and rounding up soft mats to stand on and foot stools to allow the participants to shift their weight around from time to time. Many years ago, I bought my own cooling vest to use when an operating room either needed to be warm for the patient's sake or when the air management system could not keep the room cool enough to be comfortable once our surgical teams were suited

up. Those of us who wore magnifying loupes also worked with the representatives for the companies that made them to optimize our posture when operating while wearing those loupes.

Optimizing the Ambiance of the Operating Room

Surgeons will inevitably continue to use music as a calming and familiar adjunct [10].

David Bosanquet

While the physical aspects of managing the environment in the odds ratio (OR) are important, I, and most of the surgeons with whom I have worked over the years have tried to find even more ways to optimize the OR environment, which included selecting the music that would be played while operating. Decades ago, we listened to the radio, usually tuning in to a local station that played classic rock or country music. However, I and my mates at the time gradually moved to creating our own mix tapes of music that we liked, thereby taking a bit more control of the musical environment of the rooms in which we were operating.

Choosing the Music, and the Timing of that Music, for a Case

Listening to you, I get the music. Gazing at you, I get the heat. Following you, I climb the mountain. I get excitement at your feet....[11]

See Me, Feel Me by the Who

Once I was asked by someone who had heard that we listened to music in the OR what kind of music we chose for our cases. Without giving that question much contemplation, I said that I listened to music I could hum. Upon further reflection, I realized that answer was more accurate than I might have thought in the moment. In fact, that was precisely how I chose the music that I wanted to listen to while operating: music that was familiar and that I could hum along to. I found that humming along with a familiar song could be calming and was particularly helpful when I was

performing an operation that was challenging or long or both.

When I've heard a song before, I have the pleasure of anticipating what's next. When I need to focus, familiar music helps me both relieve stress and connect with the emotions I need to be fully present [12].

Srini Pillay, MD

I spent a fair amount of time making tapes of music that I liked and that I knew would be compatible with our usual operating room teams. I eventually realized that even more precise management of the music made sense. For instance, we would choose more lively music for the initial parts of a long cardiac surgical case, such as opening the chest and taking down an internal mammary artery in the early phase of a coronary artery bypass operation. We would plan for the music to be a bit more subdued during the cross-clamp time while the more complex portions of a case, such as creating the distal anastomoses for the planned bypasses, were being performed. As these operations wound down during the time of ensuring hemostasis and closing the incisions, we would shift to more lively music, which we liked to call 'closing music'.

A Sustainable Design: Managing the Energy in the Operating Room

I developed the great teacher theory late in my freshman year... A cornerstone of the theory was that the greatest teachers had outrageous personalities..... I preferred a highly oxygenated atmosphere, a climate of feverish melodrama [13].

Pat Conroy

An appropriately managed listening environment has added energy to the room in cases that often lasted many hours, energy that was appreciated by all involved, even though we actually did do our best to tamp down the 'feverish melodrama' described by Pat Conroy in his novel, *The Lords of Discipline*. In fact, in my many decades in Surgery, I do not recall a time when one of my residents or our operating room team

members asked that music not be played during an operation (though negotiation on the actual volume of that music was, of course, appropriate from time to time).

The Overlap of Yoga and Music

I get a peaceful easy feelin' ...[14].

The Eagles, Peaceful Easy Feeling



A Yoga Practitioner Demonstrating A Common Yoga Pose.

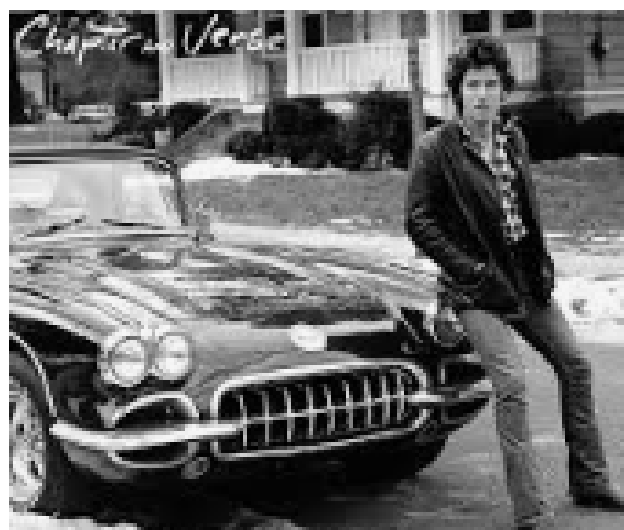
I have been a practitioner of yoga for many years. In the practice of yoga, there is a focus on breathing, with an emphasis on creating a slight constriction of an exhaled breath in a manner that creates an audible sound, at least to that person. This manner of breathing is called Bhramari Pranayama or “humming bee breathing”. The ‘magic number’ of calming breaths is about six breaths per minute [15]. This overlap of sensation and sound is touted as being calming, and I have found that to be the case myself. I eventually concluded that this ‘yogic breathing’ and humming have a lot in common. That is, I find them both to be calming, providing a ‘peaceful, easy feeling’ [16].

Eine Kleine Nachtmusik (A Little Night Music) for Specific Situations

I stood stone-like at midnight, suspended in my masquerades.

And, I combed my hair ‘til it was just right and commanded the night brigade [17].

Bruce Springsteen, Growin’ Up



Bruce Springsteen, Posing with his Corvette.

I have also had times when my team and I needed the energy necessary to rally in the moment to ‘command the night brigade’. A memorable example of this need for energy occurred one frigid January night when I was called by one of my all-time favorite residents about an hour after I had settled in for what I had expected to be a good night’s sleep, having been up for much of the prior 48 hours. When I answered the phone, my resident said, emphatically, “Hang up the phone and come to OR 20 now!” He hung up on me, knowing that I would call him back during my 15-minute drive in to the hospital. When we reconnected, he told me that he had a patient whose innominate artery had been ‘pulled off of the aorta’ in an automobile accident on an icy road and that the attending surgeon who was on call that night had minimal expertise with aortic work. Although that summary was really all I needed to know at that moment, he went on to say “we have the room all warmed up, and I have your five favorite CDs loaded in the stereo in the room.” He knew quite well the ‘just right way’ to put me in the proper frame of mind for what we would need to do for the patient on that cold night! Despite my relatively sleep deprived state, the mood in the room, when I arrived, was energizing, almost festive, and we and our ‘night brigade’ surgical team fixed that patient’s aortic injury successfully. It is worth noting that the mix of

the surgical challenge, the comradery of the surgical team, and the energy provided by our music all contributed to a successful outcome that night.

A Final Recommendation

I know a place where we can go, that's still untouched by men. We could sit and watch the clouds roll by, as the tall grass waves in the wind [18].

The End of the Innocence, Bruce Hornsby and The Range

This song (The End of the Innocence), recorded by Bruce Hornsby, is one final example of a song that comes close to encapsulating the balance of energy and peacefulness that I believe is optimal for many surgical operations.



The Author Watching Clouds Roll by, Resting in the Tall Grass ...

And, this picture of the author, following the suggestion made by Bruce Hornsby in that song, was taken on a rare day off a few years ago.

Conclusion

Familiar music or songs that you enjoy and know best are the most effective for maximizing concentration [12].

Srini Pillay, MD

We have a saying in Surgery that “everything matters, and nothing is neutral”. For music lovers like me, as well as most of my trainees and colleagues, striking a balance between visceral energy and mental calm with music is a valuable adjunct to optimizing our surgical outcomes, especially in the often complex and long operations required in the practice of cardiovascular surgery.

What makes human music so distinctive is our link between sound and motion, which is due to the connections in the human brain between the motor regions controlling our motions and the regions controlling hearing and sound, the auditory cortex.... Ultimately, music becomes a mode of mindfulness [7].

Michael Spitzer

Disclaimer

I am aware that not everyone on all surgical teams will agree with my thoughts and opinions about listening to music in the operating room. However, while the reflections in this essay are mostly my opinions, there are data to corroborate them!

Author Contributions

This manuscript was completed by CT alone.

Ethics Approval and Consent to Participate

Not applicable.

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I once had a patient for whom I had done a number of operations, ranging from resecting a lung cancer to performing some procedures for peripheral vascular disease. After one of those operations, when I was meeting with the patient's family, one of them, who

had heard about our penchant for listening to rock music during our operations, asked me who I considered to be the best rock group ever. While thinking that this question was a somewhat unusual one, I was accustomed to patients and families being interested in how we went about our work, day to day. Without much contemplation in that moment, I said that the British rock group, The Who, was my answer to that question. I defended my ‘off the cuff answer’ by noting that they had written a rock opera (*Tommy*) and had performed at the Woodstock Music Festival in the late 1960’s, which perhaps, gave them ‘an edge’ on other groups of that era. A few weeks later, a box containing all the compact discs (CD’s) ever produced by The Who arrived in my office. It turned out that one of my patient’s family members worked at a radio station and one of the benefits of that job was that they could receive, once a year, a ‘boxed set’ of the albums of any band that they chose. I later wondered if I should have chosen The Rolling Stones, as I would have received quite a few more CD’s! Nonetheless, that box of CD’s was, indeed, a memorable and greatly appreciated gift.

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Conflict of Interest

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