

## Noise, Stress, and Wellness

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Noise is described as any loud, harsh sound. A sudden or uncontrollable intense noise may trigger the human stress response. A natural coping mechanism, the human stress response occurs when we perceive something around us to be a threat. In most cases, the stress response is short-term, and the person's heart rate and blood pressure soon return to normal. Unfortunately, our stress response now takes persistent beating by the cacophony of sounds created by modern civilization.

Noise affects us without our being consciously aware of it. Unlike our eyes, which we can shut to exclude things we do not want to see, we cannot voluntarily shut our ears to exclude unwanted sounds. Our hearing mechanisms are always "on," even when we are asleep.

Everyday noise is insidious. Noise has an uncontrolled nature and is almost impossible to block. Scientists are becoming concerned that chronic exposure to noise may lead to persistent increases in stress hormone levels and blood pressure. Furthermore, the uncontrollability may contribute to greater stress and may increase the long-term risk of heart disease. Research is tracking these concerns, and several studies have evaluated the possible links between noise and stress-related health effects.<sup>1-4</sup>

### Noise and Health

Environmental noise is a threat to public health according to the World Health Organization (WHO). Researchers have documented seven categories associated with adverse health effects of noise: hearing impairment, interference with spoken communication, sleep disturbance, cardiovascular disturbances, impaired task performance, disturbances in mental health, and negative social behavior and annoyance reactions.<sup>4,5</sup> Studies related to the effects of exposure to chronic night noise show the noise produces fatigue, irritability, and poor concentration. Furthermore, while the number of awakenings per night may decrease as you adjust to the noise, the stress response remains active as you sleep and increased heart rate, blood pressure, and breathing changes persist.<sup>5</sup>

The WHO research also found that noise at home or school can affect children's ability to learn. Compared to those from quieter neighborhoods, children living near airports or busy highways tend to have lower reading scores and develop language skills more slowly. Bad moods, lack of concentration, fatigue, and poor work performance can result from continual exposure to unpleasant noise. Noise is also associ-

ated with an increase in aggression and a decrease in cooperation.<sup>5</sup>

Background noise may not only affect public health, but it also can have a negative impact on human performance in such tasks as comprehension, attention, and vigilance.<sup>3</sup> Although the effects of noise on human performance have been studied more extensively in controlled laboratory settings and nonhealthcare settings, several studies have found that excess noise in a healthcare setting can be unsafe for patients and clinicians.<sup>3,6,7</sup> In the controlled laboratory setting, noise has been associated with poor task performance, poor concentration, job dissatisfaction, irritability, fatigue, illnesses, and injuries.<sup>6</sup>

### Noise and Healthcare Workers

Noise is unavoidable in the perioperative work environment. Healthcare clinicians are confronted by different types of noise at various levels of pitch, duration, tone, and volume on a daily basis. Surgical team members are routinely exposed to high noise levels, particularly in orthopedic, neurological, and some cardiac procedures, which include extremely high peak sound levels.<sup>7</sup> Dropping surgical instruments into a pan can produce noise levels up to 80 decibels (very loud and uncomfortable). Sudden noise as little as 30 decibels can trigger the startle responses and illicit sympathetic activation.<sup>2</sup>

Research suggests that exposure to highly variable noise may be more harmful to hearing than exposure to constant noise and a potential for cumulative damage to hearing in operating room professionals. Also, it is likely that the noise in the OR significantly reduces verbal communication between members of the surgical team.<sup>6,7</sup> In publications concerning quality and safety information, the Joint Commission mentions noise as a potential risk factor related to medical and nursing errors.<sup>2,6,7</sup> Although little research demonstrates a relationship between high sound levels and medical errors, noise-related disturbance may affect patient safety.

The design of the OR allows longer reverberation times for the usual background noise associated with metal instruments and containers, which means that noise takes longer to dissipate. Factors contributing to noise in hospital settings included paging systems, alarms, telephones, staff voices, and surfaces, such as walls and ceilings that are not sufficiently sound absorbing. Noise is a distraction that interrupts patient care and may increase the risk of error. Not only loud or sudden noises provoke a stress response; chronic low-level noise has also been found to influence the brain and behavior negatively.<sup>1,3</sup>

Noise-induced stress has been related to emotional exhaustion, fatigue, and burnout among critical care nurses. Noise has been strongly related to stress and annoyance. Nurses also identified a decline in speech comprehension with increasing noise levels during some surgical procedures. Loud noises and music in the OR also can

contribute to communication problems when a clinician cannot clearly hear another person speaking. Words may be muffled by masks, further making understanding more difficult.<sup>3,6</sup>

### Noise and Music

Often we try to cover offending environmental noise with music, including in the OR. Although distinctly different from noise, music may also have negative and positive effects on human performance.<sup>8</sup>

Brain waves are modified by sounds. Music with about 60 beats per minute, such as Mozart, Brahms, and Bach, shifts the brain's activity from beta to the higher-awareness alpha waves, which can lower stress and increase concentration. Music has been shown to enhance memory and learning. Furthermore, listening to any music that is personally enjoyable has positive effects on cognition.<sup>8</sup>

Music is made up of sound; and although music has the power to soothe, sound is a two-edged sword. Certain sounds can help us heal, but others can create disharmony and stress. In the OR, loud music added to the noise from drills, anesthesia machines, sequential compression devices, and various other pieces of equipment may create a difficult work environment. Different musical tastes may cause conflict and additional stress and fatigue in the OR. Exposure to music we dislike causes negative effects, including higher blood pressure and stress.<sup>8</sup>

Music has a unique link to our emotions and can be an extremely effective stress management tool. Studies have found that surgeons are calmer, more accurate, and speedier when music is playing, keeping everything on a positive note. Listening to music on headphones has been found to reduce stress and anxiety in hospital patients before and after surgery. Furthermore, patients who listen to music after surgery are more likely to report lower pain intensity.

Noise and music have psychological components. Positive effects of noise have been noted when noise masks distracting sound or stimulates an individual to remain alert on an otherwise boring task. Highly stressed individuals have been found to be more susceptible to noise.<sup>8</sup>

Behavioral studies also show that people are less likely to help someone when the noise of a lawn mower is present. In a noisy environment with annoying music, people playing games were more likely to see their fellow players as disagreeable or threatening. Interestingly, helping behavior increased when similarly loud, but uplifting music was played.<sup>1,8</sup>

Noise is a global phenomenon. Work environments, community noise, even our homes, are filled with acute and chronic sounds that may negatively affect our health and well-being. Although, the sounds of day-to-day life, (children laughing, applause, birds singing, etc.) are important for human well-being and satisfaction, noise invades our privacy and makes us irritable. Noise affects not just our ears, but our hearts, our arteries, and our stomachs, and in the OR, noise can annoy

*Nothing is more useful than  
silence.*

*Menander of Athens*

and distract—a potential threat to patient safety.

The challenge is to reduce the levels of noise and give our nerves and immune systems a reprieve. If given a chance, our bodies are self-balancing. Create time every day to relax and take a few moments for yourself. Enjoy a regular "silence break." Stop. Just for a minute, maybe two. Take a deep breath and listen for the silence. Perhaps we cannot totally turn off the noise, but we can listen for the spaces between the sounds.■

### References

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