QuickSafety
An advisory on safety & quality issues

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Minimizing noise and distractions in the OR and procedural units

Issue:

The operating room (OR) is a setting in which health care team members perform high-risk, complex tasks that require situational awareness, concentration, transfer of information, and communication among team members.[1] Given the multitude of medical equipment used and team members present, ORs also are prone to high levels of noise, which can serve as a distraction, increasing risk for error and presenting an unsafe condition for patient safety. Noise and distractions can make it difficult to hear and discern information and communicate effectively, and it is well documented that ineffective communication is a leading contributing factor to adverse events.

Within an OR, noise levels have been associated with ineffective communication, diminished signal and speech intelligibility, poor performance of complex tasks, poor cognitive function and concentration (slower time-to-task completion), stress, fatigue and anxiety.[1-4]

There are many sources of noise and distraction within an OR with the most commonly cited being non-case relevant conversations, telephone calls, pagers, and music.

The Environmental Protection Agency's (EPA) recommended level for continuous background noise in hospitals is 45 decibels (dB), which can still interfere with concentration.[1] A study measuring noise levels in OR trauma procedures found an average noise level of almost double the recommended EPA level — 85 dB, ranging from 40dB to 130dB.[5] Orthopedic surgery and neurosurgery procedures are among those with higher sustained continuous background noise levels as compared to other procedures, with intermittent peak levels exceeding 100dB more than 40 percent of the time.[1]

Studies focused on anesthesia have found that the noisiest periods during surgery are associated with induction and emergence of anesthesia.[6] It is known that noise negatively impacts concentration and work among anesthesiologists,[3] as well as reduces the ability to detect signals from monitors and other equipment.[7] A 17 percent reduction in the accuracy with which anesthesia residents detected changes in saturation on a pulse oximeter was found in a laboratory study simulating OR background noise.[7]

Common sources of noise and distraction in the OR

Technological and environmental

- Phones
- Paging systems (personal and overhead)
- Computers
- Wireless communication systems
- Music devices
- Medical equipment/devices
- Monitors, clinical alarms
- Metal equipment, instruments
- Environmental conditions (for example, ventilation)

Behavioral

- Case-related conversation
- Non-case related conversation
- Patient care activities
- Staff entering, leaving OR

Noise can serve as a source of distraction, diverting attention from one task and concurrently orienting to the source of distraction, increasing the risk for lapse or omission. A prospective study evaluating noise levels in hernia repairs found that, of patients who developed a surgical site infection, noise levels were substantially higher during the period of wound closure, suggesting a potential distraction and lapse in compliance with aseptic processes.[8] Distractions, such as case-irrelevant communication, during urologic procedures were found to negatively correlate with completion of safety checks.[9] Within OR trauma surgeries with an

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average noise level of 85 dB, distractions and interruptions were found to have occurred on average 60.8 times.[5]

Safety Actions to Consider:

While eliminating all sources of noise and distraction within an OR is not feasible, as many sources are necessary and unavoidable, organizations should consider a systems approach and facilitate conditions that minimize distractions and noise that can impede concentration and communication and negatively impact patient and staff safety.

The following actions can be taken to specifically address noise levels in the OR:

- Create a "no-interruption zone" (also known as "sterile cockpit") during critical phases of a procedure, prohibiting nonessential conversation and activities.[1, 10]
- Consider measuring noise levels within the OR to provide evidence for noise-reduction strategies, empirical data reflecting efficacy of such strategies, as well as real-time information to the OR team as to when noise levels are exceeding recommended levels.[2]
- Educate staff on sources of noise, its impact to patient and staff safety, and noise reduction strategies.
- Consider equipment alternatives that produce less noise, whenever possible.
- Consider the physical environment and means for attenuating noise. For example, minimize dropping metal instruments into instrument trays.
- Consider simulation and training to enhance focused attention skills in the presence of continuous and intermittent noise and distractions.[3,9]
- Consider simulation training to model strategies for reducing noise (e.g., equipment use, communication techniques, speaking up to reduce noise, etc.).

The remaining actions can be taken to support decreasing noise in the work environment:

- Foster a safety culture in which staff feel empowered and comfortable speaking up and asking for silence.[11]
- Establish policy and a code of conduct to minimize noise and distraction (code of conduct regarding entering/leaving room, unnecessary conversation, use of phones and pagers, use of music, etc.).[11, 12]
- Consult staff to understand resource needs for cellphones, pagers and tablets, and establish policies around them. Minimize tones that are similar to monitors and alarms within the OR.
- Practice effective team communication strategies to ensure information has been effectively received.

Resources:

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5. Pereira BM, et al. Interruptions and distractions in the trauma operating room: Understanding the threat of human error. *Revista do Colegio Brasileiro de Cirurgioes*. 2011;38(5):292-298.
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7. Stevenson R, et al. Effects of divided attention and operating room noise on perception of pulse oximeter pitch changes: A laboratory study. *Anesthesiology*. 2013;118(2):376-81.
8. Dholakia S, et al. The association of noise and surgical-site infection in day-case hernia repairs. *Surgery*. 2015;157(6):1153-6.
9. Mentis HM, et al. A systematic review of the effect of distraction on surgeon performance: Directions for operating room policy and surgical training. *Surgical Endoscopy*. 2016;30(5):1713-24.

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11. Persoon M, et al. The effect of distractions in the operating room during endourological procedures. *Surgical Endoscopy*. 2011;25(2):437-43.
12. Weldon S, et al. Music and communication in the operating theatre. *Journal of Advanced Nursing*. 2015;71(12).
13. Chen L & Brueck S. Evaluation of potential noise exposures in hospital operating rooms. Health Hazard Evaluation Report HETA 2008-0231-3105. West Virginia University Hospital, Morgantown, West Virginia. 2010.

Note: This is not an all-inclusive list.