



Earbuds and Other Personal Auditory Devices in the Operating Room

by Karolina Brook, MD, FASA, CPPS; Danielle Horn, MD; Govind Rangrass, MD, FASA; and Lauren Lobaugh, MD, MAS, CPPS, FAAP

INTRODUCTION

The use of small, in-ear personal auditory devices (PADs), such as earbuds, as well as bone conduction devices (which use vibration to transmit sound energy from the skull to the cochlea)¹ by anesthesiology professionals in the operating room (OR) has increased in prevalence and is a new potential noise pollutant in the OR. Noise pollution is a known occupational hazard in the OR.² Recommendations for maximum noise thresholds vary; the World Health Organization recommends noise levels in hospitals not exceed 35 decibels (dB),³ the United States Environmental Protection Agency recommends a 45 dB cut-off over 24 hours,⁴ and the U.S. Occupational Safety and Health Administration (OSHA) defines an 8-hour, time-weighted average of 85 dB as the threshold at which hearing conservation programs should be initiated.⁵ Noise levels in the OR routinely surpass these recommendations.⁶⁻⁸

Online discussions about earbud use by anesthesiology professionals first appeared on the Student Doctor Network Forum in 2020.⁹ While direct epidemiologic data on anesthesia professionals' use of PADs in the operating room are limited, available surveys suggest that such use is occurring in the perioperative environment.¹⁰ Anecdotally, the authors have witnessed increasing use of these devices in the OR. Here, we review the consequences and potential benefits of the use of PADs by anesthesia professionals.

POTENTIAL BENEFITS OF PAD USE

For anesthesia professionals, operating room work alternates between periods of higher task complexity (management of induction, emergence, or physiologic instability) and periods of relative stability (maintenance phases during low-acuity cases). Distracting events during anesthesia are common throughout cases, but are not uniformly harmful; in one study of 30 anesthetics, distracting events occurred frequently, with most judged to have no externally visible negative effect.¹¹ Most clinicians likely develop "tacit" strategies to manage background intrusions while sustaining attention and vigilance. Within that context, some anesthesiology professionals perceive personal audio (music, podcasts, audiobooks) as a tool to (a) reduce boredom during long, stable phases, (b) regulate mood and stress during



demanding call schedules, (c) maintain a sense of cognitive "anchoring" (staying engaged rather than disengaging into other nonclinical activities, like perusing social media on a cell phone),^{12,13} and (d) provide education (specifically in the case of anesthesia-related podcasts). Evidence related to the benefits of auditory distractions in the OR is largely focused on OR music rather than PADs. Many OR staff view music as beneficial, and background music can, in some circumstances, reduce subjective stress or anxiety.¹⁴

POTENTIAL RISKS OF PAD USE

Anesthesia professionals are responsible for uninterrupted, vigilant physiologic monitoring and rapid response to evolving conditions. Providing anesthesia requires intense cognitive multitasking, including the simultaneous interpretation of auditory alarms, visual monitors, and verbal cues while performing clinical procedures, documenting, and constantly anticipating and preventing adverse events. This high-demand environment is often characterized by prolonged periods of stability punctuated by sudden crises (Table 1). PADs can potentially reduce peripheral situational awareness, causing the anesthesia professional to miss the "weak signals" that prompt early intervention such as changes in ventilatory mechanics, evolving bleeding, intravenous infiltration, patient movement, or shifts in team dynamics. In observational studies, distracting events cluster during transitions and emergence, precisely when task density and risk are higher. Quality improvement initiatives that explicitly created distraction-free induction zones were motivated

by similar concerns about noise and nonessential talk during induction.¹⁵

Direct evidence evaluating the frequency of anesthesia professionals' PAD use in the OR, or its impact on performance and patient outcomes, is sparse. As a result, current understanding relies on extrapolation from broader literature on OR noise, music, and distraction. Excess noise levels in the OR are associated with multiple negative outcomes, including hearing loss,⁵ increased stress levels in both operating room staff¹⁶ and patients,⁸ impaired communication,¹⁷ and worse patient safety outcomes, such as an increase in surgical site infections^{18,19} and medical errors.^{7,17} A study in pediatric ORs where sound levels were reduced through educational interventions showed a lower incidence of postoperative complications in the lower-noise intervention group.²⁰ Music is one type of noise pollution that has shown conflicting results in studies; some find it may enhance performance in the OR, while others find it may impair communication and increase distraction, since music preferred by some team members may be distracting for others.^{14,17,21,22}

Prior literature has documented the negative effects of non-patient-care activities, such as intraoperative reading, on anesthesia vigilance.²³ Efforts such as creating and educating perioperative clinicians on physical areas termed "no interruption zones" further reflect institutional attempts to mitigate preventable attentional lapses in high-risk clinical environments.²⁴ Unlike ambient noise or intermittent interruptions, PADs could introduce continuous, individualized auditory input, which may reduce the ability to hear ambient noise and may be more difficult to regulate. While autonomy and comfort are important, even small degradations in situational awareness may carry disproportionate risk in a specialty where seconds matter, and auditory vigilance is central to patient safety.^{25,26} In studies involving anesthesiology residents, increased visual attentional load and background OR noise reduced accuracy and slowed responses in detecting pulse oximeter pitch changes and resulted in poorer clinical reasoning performance.^{27,28} This matters because early signs of impending patient deterioration in the operating room are often first

Table 1. Sample Scenarios Where PADs Are Used and Implications Based on the TeamSTEPPS Framework for Team Performance.³⁸

Scenario	Implications
Induction: Missed Equipment Gap During Rapid Desaturation: A 54-year-old man with BMI 42, severe OSA, and GERD presents for laparoscopic cholecystectomy. After preoxygenation, propofol 200 mg and rocuronium 100 mg are administered. The anesthesia professional, wearing earbuds at low volume, proceeds with airway management as the rocuronium takes effect. Mask ventilation becomes difficult. The circulating nurse says, “The video laryngoscope isn’t in here yet.” This is not fully processed by the anesthesia professional. Direct laryngoscopy reveals a Grade 3 view. Oxygen saturation falls from 100% to 76% before a second provider brings the video laryngoscope and intubation is achieved.	TeamSTEPPS: Breakdown in situation monitoring, communication. Failure: Missed equipment readiness cue; no reassessment of airway plan; loss of shared situational awareness. Significance: Induction compresses time between apnea and desaturation; missed communication eliminates safety margins.
Emergence: Delayed Recognition of Laryngospasm: A 7-year-old undergoes adenotonsillectomy with deep extubation. The anesthesia professional turns to chart while wearing earbuds. The patient develops a subtle inspiratory stridor. SpO ₂ remains 99%, but capnography becomes irregular. The surgeon remarks, “They sound tight.” The anesthesia professional responds only after saturation falls to 90%, by which point complete laryngospasm has developed, requiring positive pressure ventilation, propofol, and succinylcholine.	TeamSTEPPS: Breakdown in mutual support, communication and situation monitoring. Failure: Missed early auditory cues; over-reliance on monitors; delayed intervention. Significance: Airway events evolve in seconds; sound is often the earliest warning.
Transport & Handoff: Lost Medication Timing: A 68-year-old woman undergoes total knee arthroplasty. In the final 15 minutes, she receives both fentanyl 100 mcg and hydromorphone 1 mg IV. During transport, the anesthesia professional wears one earbud. In PACU, report includes, “Pain meds on board,” without details. When asked, “Anything recent?” the anesthesiologist nods but does not clarify. Ten minutes later, the patient becomes somnolent with RR 6 and SpO ₂ 89%.	TeamSTEPPS: Breakdown in communication. Failure: Incomplete communication of opioid dosing/timing; lack of closed-loop communication; divided attention. Significance: Handoffs require precision and redundancy. Vague communication creates preventable harm.
PACU/ICU Transition: Missed Escalation in a Noisy Environment: A 3-year-old recovering from MRI sedation becomes progressively hypoventilated in PACU. A nurse calls out, “Can anesthesia come take a look?” The anesthesia professional, wearing earbuds while reviewing another case, does not respond initially. Only after a second, louder call do they look up. The child now has shallow respirations requiring intervention.	TeamSTEPPS: Breakdown in situation monitoring, communication. Failure: Reduced awareness of ambient cues; delayed response; narrowed attention. Significance: Recovery areas rely on shared vigilance. Alarms and tone of voice are critical signals.
Unstable Patient: Delayed Recognition of Hemorrhagic Shock: A 32-year-old undergoing exploratory laparotomy develops hypotension (70/40) and tachycardia (140) as the field fills with blood. The surgeon states urgently, “We need blood now.” The anesthesia professional, wearing earbuds, asks for repetition while the team escalates. Activation of massive transfusion is delayed.	TeamSTEPPS: Breakdown in communication, mutual support and leadership. Failure: Delayed processing of urgent communication; loss of team synchronization; slower escalation. Significance: Crisis management depends on immediate, shared awareness. Seconds matter.

BMI: body mass index; OSA: obstructive sleep apnea; GERD: gastroesophageal reflux disease; SpO₂: peripheral capillary oxygen saturation; IV: intravenous; PACU: postanesthesia care unit; ICU: intensive care unit; MRI: magnetic resonance imaging; RR: respiratory rate

detected as subtle trends or tonal changes, not only as obvious alarms.

PADs that occlude the auditory canal introduce additional risk pathways beyond ambient OR noise, particularly if both ears are occluded or if active noise reduction is used. They can reduce the reliability of closed-loop communication (missed or delayed responses to surgeons, nursing staff, trainees, or perfusion), increasing the likelihood of repeated requests, frustration, or uncorrected misunderstanding. Observational and simulation-based work suggests that OR distractions are associated with increased stress/workload and degraded teamwork, making communication failures more consequential during high-demand periods.²⁹

PADs raise concerns in teaching environments; if trainees perceive an attending as less accessible or less attentive, they may speak up later or less confidently, with consequences for psychological safety and timely escalation.³⁰ Similarly, attendings may perceive trainees or advanced practice clinicians utilizing PADs as less attentive, impairing trust in the care team model. Infection control considerations also apply to devices brought into the OR. Studies in operative environments have reported high rates of microbial contamination on mobile phones, reductions after disinfection, and subsequent recontamination; by extension, it is likely that routine disinfection practices and clear device-handling rules are needed for PADs as well.³¹

Anesthesiology professionals’ use of PADs in the OR is not solely an individual choice; rather, it is a cultural signal. It implicitly communicates the acceptability of use to the trainees, nurses, advanced practice providers, and other team members. This role-modeling effect may normalize a behavior that undermines shared vigilance, particularly in a hierarchical environment where speaking up already carries perceived risk. Psychological safety depends on team members believing that they will be heard promptly and taken seriously. The perception (whether accurate or not) that an anesthesia professional is partially disengaged can erode trust and hinder closed-loop communication, which is an integral component of team-based patient care. In alignment with Just Culture

principles, the team bears shared accountability to optimize human behavior to limit risk to patients; whenever possible, behavioral choices (i.e., refraining from using PADs while providing patient care) should be made to avoid adverse outcomes.³²

Allowances for PAD use may be a response to short staffing and limited nonclinical time. PADs may allow clinicians in leadership positions to participate in meetings while in the OR. This is a double-edged sword; while multi-tasking in this way can mitigate some of the stresses of short staffing by allowing clinicians to continue with their non-OR tasks and projects, participating in meetings while in the OR is distracting. Further, the non-anesthesiology professionals in the OR may not know that the clinician is participating in a crucial meeting, and may perceive the provider as engaging in personal matters. This misunderstanding can degrade others' perceptions of anesthesiology providers and their professionalism.

Patient perception and post-event scrutiny must also be considered. The importance of sustained vigilance while providing anesthesia is reinforced by evidence linking excess noise and distraction in the operating room to impaired communication, increased error rates, and worse patient outcomes.^{717,33} In the aftermath of an adverse event, the discovery that an anesthesia professional was using a PAD may be interpreted as a discretionary choice that introduced avoidable risk. Such a finding could complicate root cause analyses by shifting focus from system factors toward individual behavior, particularly if distraction is perceived as a plausible contributing factor. From a medicolegal perspective, this may expose clinicians to increased liability by undermining claims of continuous attentiveness and adherence to professional standards.³³

One caveat is that deaf and hard-of-hearing clinicians are entering medical school in increasing numbers³⁴ as the expectation has shifted from clinicians requiring normal native hearing to being able to function normally with aids. Bone conduction devices and hearing aids may facilitate the ability of these clinicians to practice in the OR. It is important to recognize that clinically necessary hearing aids may appear similar to PADs and many people may not know the difference.

EVIDENCE AND REGULATORY LANDSCAPE

Evidence directly related to PAD use by anesthesia professionals is limited, so policies should rely on stronger adjacent evidence and widely accepted guidance. The Anesthesia Patient Safety Foundation (APSF) highlights lia-

bility concerns related to distraction and divided attention, particularly during critical phases of care.²⁵ The APSF conference report emphasizes that distractions can degrade vigilance and situational awareness and calls for open discussion, education, research, and policy to reduce high-risk distractions.³⁰ The American Society of Anesthesiologists (ASA) emphasizes the importance of minimizing distractions and recommends risk-stratified policies that account for task complexity and patient acuity.²⁶

The Joint Commission recommends system approaches such as policies/codes of conduct addressing phones and music, education on noise sources, and no-interruption ("sterile cockpit") periods during critical phases.³⁵ The American College of Surgeons similarly promotes sterile cockpit logic and explicitly notes that earphones must not compromise the sterile field.³⁶ The Association of periOperative Registered Nurses (AORN) states that nonclinical distractions/noise should be minimized, critical phases should have no-interruption zones, and personal devices should be limited to direct patient care or procedure-relevant use.³⁷

REASONABLE GUARDRAILS FOR ANESTHESIOLOGY DEPARTMENTS

Given the limited evidence and the high-stakes nature of anesthetic care, departments should carefully weigh the potential benefits and risks of PAD use in the OR. A complete prohibition offers simplicity and enforceability but may drive disengagement, inconsistent enforcement, or covert workarounds. Conversely, permissive policies without clear boundaries risk normalization of unsafe practices. If departments elect to allow conditional use, guardrails should be explicit, narrow, and grounded in patient safety, with clearly defined expectations for when PAD use is or is not acceptable. Guideline development should incorporate multidisciplinary input and be supported by education, leadership alignment, and consistent enforcement. Addressing violations through coaching rather than punishment aligns with a Just Culture approach while reinforcing shared accountability.

CONCLUSION

Without open discussion, the use of PADs in the OR may continue unchecked, including in situations where distraction could place patients at risk. At present, no guidelines specifically address anesthesiology professionals' use of these devices, and it remains uncertain whether defined guardrails can fully mitigate potential harm. Until stronger evidence emerges, a cautious, patient-centered approach—prioritizing vigilance, continuous

monitoring, and clear communication—offers the most defensible path forward.

Karolina Brook, MD, FASA, CPPS, is a member of the Department of Anesthesiology, Boston Medical Center, Boston, MA.

Danielle Bodzin Horn, MD, is an associate professor of clinical anesthesiology in the Department of Anesthesiology and Pain Medicine, University of Miami Miller School of Medicine/Jackson Memorial Hospital, Miami, FL.

Govind Rangrass, MD, FASA, is a professor of anesthesiology and critical care at SSM Health Saint Louis University Hospital, Saint Louis, MO.

Lauren Lobaugh, MD, MAS, CPPS, FAAP, is an associate professor in the Department of Anesthesiology, Perioperative, and Pain Medicine, Baylor College of Medicine, Houston, TX.

Dr. Brook reports being an employee of both Prenuvo, Inc. and one of its exclusively affiliated professional corporations. She serves as vice president and chief quality officer. She holds stock options and/or equity in Prenuvo, Inc., and receives a salary for her employment. The other authors report no conflicts of interest.

REFERENCES

1. Ellsperman SE, Nairn EM, Stucken EZ. Review of bone conduction hearing devices. *Audiol Res.* 2021;11:207–219. PMID: 34069846.
2. Cunha K, Testani B, Vitello A. Are you safe behind the drape: considerations for mitigating occupational hazards among anesthesia providers. *AANA J* 2025;93:463–470. PMID: 41329176.
3. Berglund B, Lindvall T, Schwela DH. New WHO guidelines for community noise. *Noise Vib Worldw.* 2000;31:24–29. doi:10.1260/0957456001497535.
4. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. Published online March 1974. <https://nepis.epa.gov/Exe/ZyNET.exe/2000L3LN.TXT?ZyActionD=ZyDocument&Client=EPA&Index=Prior+to+1976&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czfiles%5Cindex%20Data%5C70thru75%5Ctxt%5C00000001%5C2000L3LN.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL>. Accessed December 19, 2025.
5. Occupational Safety and Health Administration. Occupational noise exposure. <https://www.osha.gov/noise>. Accessed December 19, 2025.
6. Dixon A, Sieben NA, Sun J. Assessing noise pollution in surgery: a quantitative analysis of anaesthesia machines, staff conversations, and procedure specific acoustics. *ANZ J Surg.* 2025;95:2592–2598. PMID: 41190583.
7. Mcleod R, Myint-Wilks L, Davies S, Elhassan H. The impact of noise in the operating theatre: a review of the evidence. *Ann R Coll Surg Engl.* 2021;103:83–87. PMID: 33559553.
8. Hasfeldt D, Laerkner E, Birkelund R. Noise in the operating room—what do we know? a review of the literature. *J Peri-anesth Nurs.* 2010;25:380–386. PMID: 21126668.

9. Wearing airpods in the OR? Student Doctor Network Forums. October 28, 2020. <https://forums.studentdoctor.net/threads/wearing-airpods-in-the-or-1426958/> Accessed December 19, 2025.
10. Porter SB, Renew JR, Paredes S, et al. Development, validation, and results of a survey of personal electronic device use among 299 anesthesia providers from a single institution. *Anesth Analg*. 2022;134:269–275. PMID: 34403379.
11. Campbell G, Arfanis K, Smith AF. Distraction and interruption in anaesthetic practice. *Br J Anaesth*. 2012;109:707–715. PMID: 22750727.
12. Ullmann Y, Fodor L, Schwarzberg I, et al. The sounds of music in the operating room. *Injury*. 2008;39:592–597. PMID: 16989832.
13. Narayanan A, Gray AR. First, do no harmony: an examination of attitudes to music played in operating theatres. *N Z Med J*. 2018;131:68–74. <https://natlib.govt.nz/records/40247698>.
14. Narayanan A, Pearson L, Fisher JP, Khashram M. The effect of background music on stress in the operating surgeon: scoping review. *BJS Open*. 2022;6:zrac112. PMID: 36221189.
15. Crockett CJ, Donahue BS, Vandivier DC. Distraction-free induction zone: a quality improvement initiative at a large academic children's hospital to improve the quality and safety of anesthetic care for our patients. *Anesth Analg*. 2019;129:794–803. PMID: 31425222.
16. Idrees S, Sabaretnam M, Chand G, et al. Noise level and surgeon stress during thyroidectomy in an endocrine surgery operating room. *Head Neck*. 2024;46:37–45. PMID: 37860889.
17. Wahr JA, Abernathy JH. Too loud to hear myself think: deleterious effects of noise in the operating room. *Br J Anaesth*. 2024;132:840–842. PMID: 38448271.
18. Kurmann A, Peter M, Tschann F, et al. Adverse effect of noise in the operating theatre on surgical-site infection. *Br J Surg*. 2011;98:1021–1025. PMID: 21618484.
19. Dholakia S, Jeans JP, Khalid U, et al. The association of noise and surgical-site infection in day-case hernia repairs. *Surgery*. 2015;157:1153–1156. PMID: 25737006.
20. Engelmann CR, Neis JP, Kirschbaum C, et al. A noise-reduction program in a pediatric operation theatre is associated with surgeon's benefits and a reduced rate of complications: a prospective controlled clinical trial. *Ann Surg*. 2014;259(5):1025–1033. PMID: 24394594.
21. Narayanan A, Naidoo M, Kong V, et al. Broad responses and attitudes to having music in surgery (the BRAHMS Study): an Australia and Aotearoa New Zealand perspective. *Surg Open Sci*. 2024;17:30–34. PMID: 38274239.
22. Hawksworth C, Asbury AJ, Millar K. Music in theatre: not so harmonious. A survey of attitudes to music played in the operating theatre. *Anaesthesia*. 1997;52:79–83. PMID: 9014553.
23. Slagle JM, Weinger MB. Effects of intraoperative reading on vigilance and workload during anesthesia care in an academic medical center. *Anesthesiology*. 2009;110:275–283. PMID: 19194155.
24. Patterson P. Adopting a "no interruption zone" for patient safety. *OR Manager*. 2013;29:20–22. PMID: 23424828.
25. Thomas BJ. Distractions in the operating room: an anesthesia professional's liability? *APSF Newsletter*. 2017;31:59–61. <https://www.apsf.org/article/distractions-in-the-operating-room-an-anesthesia-professionals-liability/>. Accessed February 2, 2026.
26. ASA Committee on Quality Management and Departmental Administration. Statement on distractions (Last amended - October 15, 2025; Original Approval: October 28, 2015). <https://www.asahq.org/standards-and-practice-parameters/statement-on-distractions>. Accessed February 2, 2026.
27. Stevenson RA, Schlesinger JJ, Wallace MT. Effects of divided attention and operating room noise on perception of pulse oximeter pitch changes: a laboratory study. *Anesthesiology*. 2013;118:376–381. PMID: 23263015.
28. Enser M, Moriceau J, Abily J, et al. Background noise lowers the performance of anaesthesiology residents' clinical reasoning when measured by script concordance: a randomised crossover volunteer study. *Eur J Anaesthesiol*. 2017;34:464–470. PMID: 28394819.
29. Wheelock A, Suliman A, Wharton R, et al. The impact of operating room distractions on stress, workload, and teamwork. *Ann Surg*. 2015;261:1079–1084. PMID: 26291954.
30. van Pelt M, Weinger MB. Distractions in the anesthesia work environment: impact on patient safety? Report of a meeting sponsored by the Anesthesia Patient Safety Foundation. *Anesth Analg*. 2017;125:347–350. PMID: 28609339.
31. Shakir IA, Patel NH, Chamberland RR, Kaar SG. Investigation of cell phones as a potential source of bacterial contamination in the operating room. *J Bone Joint Surg Am*. 2015;97:225–231. PMID: 25653323.
32. American Society of Anesthesiologists. Statement on Safety Culture. Statement on Safety Culture. October 2022. <https://www.asahq.org/standards-and-practice-parameters/statement-on-safety-culture>. Accessed July 18, 2023.
33. Preferred Physicians Medical. Asleep at the wheel? Distractions in the operating room. *Anesth Law*. 2014. <https://www.ppmrrg.com/hubfs/PPM%20Site%20Files/Anesthesia%20and%20the%20Law/Issue39.pdf>.
34. Argenyi M. Technical standards and deaf and hard of hearing medical school applicants and students: interrogating sensory capacity and practice capacity. *AMA J Ethics*. 2016;18:1050–1059. PMID: 27780030.
35. The Joint Commission. Minimizing noise and distractions in the OR and procedural units. *Quick Safety*. 2017. <https://digitalassets.jointcommission.org/api/public/content/8e6000f92ac24fc39d8040898e0424dc?v=525f5a77>.
36. American College of Surgeons. Statement on distractions in the operating room. ACS. <https://www.facs.org/about-ac/s/statements/distractions-in-the-operating-room/>. Accessed April 25, 2026.
37. AORN. AORN Position statement on managing disruptions, distractions, and noise during perioperative patient care. Published online 2025. https://www.aorn.org/docs/default-source/guidelines-resources/position-statements/patient-workplace-safety/posstat-noisedistraction-022525.pdf?sfvrsn=de93df2b_1.
38. Agency for Healthcare Research and Quality. Pocket Guide: TeamSTEPPS. Accessed April 11, 2023. <https://www.ahrq.gov/teamstepps/instructor/essentials/pocketguide.html>.