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Consensus Recommendations for the Safe Conduct of Nonoperating Room Anesthesia:

A Meeting Report From the 2022 Stoelting Conference of the Anesthesia Patient Safety Foundation

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Nonoperating room anesthesia (NORA) cases are projected to exceed 50% of total anesthesia cases in the near future.[1] Although one large-scale study failed to show a difference in mortality between NORA and operating room (OR) settings,[2] multiple analyses of data from the American Society of Anesthesiologists (ASA) Closed Claims database have revealed that adverse events occur nearly twice as often in NORA locations as they do in the OR.[2-4]

Patient safety in NORA locations may be compromised by problems with ergonomics, location, staffing, teamwork and communication, access to equipment, lack of adequate preoperative optimization, and much more. Other than the ASA Statement on Nonoperating Room Anesthetizing Locations, there have been no widely available recommendations on how to establish, maintain, and standardize safe workflows in NORA.[5]

In 2022, the Anesthesia Patient Safety Foundation (APSF) convened a multidisciplinary group of experts to organize the annual Stoelting Consensus Conference on "Crucial Patient Safety Issues in Office-Based and Non-operating Room Anesthesia." The objective of the conference was to determine consensus recommendations for best practices in NORA around areas of facility and location, equipment and supplies, staffing and teamwork, patient selection, periprocedural care, and quality improvement. A brief summary of our process and results follows.

METHODS

The conference planning committee (the authors) created a conference program to address the unique challenges of NORA (Table 1). Simultaneously, they created the first draft of NORA recommendations, which was then revised and sent to conference speakers and attendees. The recommendations were revised consistent with the feedback provided and presented to breakout groups during the conference. Additional feedback and revisions were then presented to all conference attendees on the last day for discussion and voting. After the meeting, there were further revisions from the conference planning committee, speakers, and participants, which led to consensus-derived recommendations (Supplemental Digital Content 1, Table 1, http://links.lww.com/AA/E369). Ethical considerations, inclusion and exclusion criteria, a list of speakers, and further details of the consensus development process can be found in Supplemental Digital Content 2, Appendix A, http://links.lww.com/AA/E370.

Table 1: 2022 Stoelting Conference Session Description.

Day	Session	Objectives
1	Requirements for a safe and effective anesthetic regardless of location	Understand the issues that may lead to mismatch between patient selection and preparation and the capabilities of NORA locations and their staff
1	Appropriate patients and procedures	Review patient selection criteria, appropriate staffing, equipment, and monitoring availability to deliver anesthesia appropriate to the situation and any other issues associated with potential patient safety problems in isolated procedure rooms, free-standing surgical centers, offices, and procedure centers
1	Designing NORA for patient safety: beyond current state to a future best practice	Discuss opportunities to promote patient safety using clear outcome measurements and data-driven improvement initiatives in all NORA cases
2	Impending issues: disruptors and innovation	Craft specific recommendations that APSF can use to influence changes that improve patient safety in NORA practices

Abbreviations: APSF, Anesthesia Patient Safety Foundation; NORA, nonoperating room anesthesia.

RESULTS

A summary of the 42 recommendations is presented in Supplemental Digital Content 1, Table 1, http://links.lww.com/AA/E369. These recommendations apply to the provision of anesthesia or sedation in NORA locations, which include, but are not limited to, non-OR procedural areas in the inpatient and outpatient settings, including office-based areas like dentistry. These recommendations related to the following domains: facility (9 statements), equipment, medications, and supplies (16 statements), staff and teamwork (4 statements), preprocedure care and patient selection (6 statements), intraprocedure care (2 statements), postprocedure care (3 statements), and continuous quality improvement (2 statements).

DISCUSSION

NORA locations are known to be fraught with patient safety concerns and high stress.[6,7] The ASA's Statement on Nonoperating Room Anesthesia provides guidance on safety considerations for NORA related primarily to facility and equipment issues. The APSF recommendations build on these considerations and provide a template for clinicians to improve teamwork, personnel, and preoperative optimization, which are key patient safety issues in NORA.[1,5]

The recommendations address many areas that are cited as contributory to safety problems in NORA: facility and location, access to equipment and supplies, teamwork issues, periprocedural care, and quality improvement. While the need for anesthesia services outside of the OR has expanded exponentially in the past decade,[8,9] few hospitals are constructed with NORA as a priority.

GLOSSARY: APSF = Anesthesia Patient Safety Foundation; ASA = American Society of Anesthesiologists; NORA = nonoperating room anesthesia; OR = operating room

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NORA Consensus Recommendations (cont'd)

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Supplemental Table 1: Consensus summary for the safe conduct of anesthetic care in NORA locations.

FACILITY

1. Anesthesiology personnel should participate in planning, construction, expansion, or remodeling of NORA locations to ensure that patient safety and anesthetic needs are met.
2. Anesthesiology personnel should encourage facility design teams to group NORA suites together, near the OR, or the PACU, to facilitate rapid access to additional personnel and equipment when needed.
3. A reliable source of oxygen adequate for the length of the procedure and an immediately available backup supply are required. A central oxygen supply is ideal.
4. A scavenging or capture system for anesthetic gas is required in locations where inhaled anesthesia is used.
5. Electrical outlets shall be sufficient to supply anesthesia equipment and labeled to identify the backup power supply. The number of outlets available for backup power shall be sufficient to power equipment required to safely care for patients.
6. Lighting shall be available to visualize the patient, equipment, supplies, and medications. Battery-powered backup lighting shall be available.
7. There should be sufficient space to accommodate personnel with adequate clearance and expeditious access to the patient, equipment, supplies, and medications. Sufficient space shall be available to bring emergency equipment into the room.
8. A source of continuous suction shall be available and dedicated for use by anesthesiology personnel.
9. Pre- and postprocedural areas shall be available for preparing and recovering the patient.

EQUIPMENT, MEDICATIONS, AND SUPPLIES

1. Anesthesiology personnel should participate in capital budget planning for equipment required to set up, maintain, and improve NORA services.
2. When volatile anesthetics are administered, an anesthesia machine sufficient for case types and maintained to facility standards is required.
3. Emergency airway equipment, including multiple forms of rescue (e.g., supraglottic airways, video laryngoscope, cricothyrotomy kit, etc.) is required for each NORA location.
4. A self-inflating hand resuscitator bag capable of delivering positive pressure ventilation while administering at least 90 percent oxygen is required.
5. In each NORA location, emergency supplies including a defibrillator, medications, and other equipment to provide cardiopulmonary resuscitation are required.
6. Equipment and medication for treatment of MH shall be present in all locations where volatile anesthetics are used.
7. Succinylcholine or other equivalent rapid acting paralytic medications should be immediately available for emergency airway management in all NORA locations. When succinylcholine is present, staff shall be educated on MH and prepared to provide and aid treatment.
8. Infusion pumps should incorporate dose error reduction systems (DERS).
9. Diagnostic testing capability appropriate for the patient population and planned procedures is required.
10. Appropriate blood products and the equipment required for administration, such as a fluid warmer, shall be available for procedures that may have clinically significant blood loss.
11. MRI-safe equipment, including airway equipment, infusion pumps, monitors, and anesthesia machines shall be available for MRI, and providers trained on their use. Patient monitoring consistent with operating room standards should be displayed in the MRI control room.
12. Intralipid for treatment of local anesthetic systemic toxicity (LAST) shall be available at NORA locations where local anesthetic is used for purposes other than local skin infiltration.
13. Patient size and weight capacity limits should be established for each NORA site to confirm patient suitability based on equipment and other available resources.
14. Crisis manuals appropriate for the patient population, procedures, and potential therapeutic complications shall be available to staff and clearly visible in each NORA location to serve as cognitive aids during emergencies.
15. Protective equipment, including, but not limited to lead aprons, goggles and radiation shields shall be made available to all anesthesia personnel where radiation exposure may occur.
16. Equipment, such as inflatable mattresses, for patient transfer to and from procedure table shall be available to avoid injury to patient and personnel.

STAFF AND TEAMWORK

1. Communication, team building, expectations, and training should be established through a proactive collaborative process driven by anesthesiology personnel, nursing, surgical, and proceduralist leadership.
2. In each NORA location adequate staff shall be trained to support the patient and the anesthesiology care team. The NORA team shall include at least two individuals with appropriate certification (ACLS, BLS, or PALS) and defined responsibilities to provide patient care during emergencies.
3. Anesthesiology personnel should triage and evaluate complex cases, assist with scheduling, and optimize quality and safety protocols. A dedicated NORA anesthesiology team should be considered to facilitate communication and the adoption of protocols and pathways.
4. Team members names and roles should be posted in the NORA location to facilitate communication during patient care.

PREPROCEDURAL CARE AND PATIENT SELECTION

1. A preprocedural evaluation process shall be established based on the ASA Practice Advisory for Preanesthesia Evaluation and emerging best practice.
2. Adult and pediatric patient comorbidities should be identified which require specialized preoperative evaluation or necessitate procedural care in an inpatient facility.
3. Adult and pediatric patients with elevated BMI or a diagnosis or suspected diagnosis of OSA should be evaluated on a case-by-case basis for suitability for the planned procedural location and management plan.
4. Before each procedure, a timeout shall be conducted per The Joint Commission Universal Protocol or according to the facility protocol including site marking and laterality as indicated.
5. Appropriate education shall be provided to team members for new or unfamiliar procedure types, and specific aspects of the case shall be reviewed with NORA staff.
6. All patients should be assessed for fall and venous thromboembolism risk and treated appropriately.

INTRAPROCEDURE CARE

1. Intra-procedural monitoring shall adhere to ASA Standards for Basic Anethetic Monitoring with additional monitoring based on patient comorbidities and/or the nature of the procedure.
2. A formal system to call for assistance, designate personnel to respond, and transport a patient with appropriate monitoring from the NORA location to an in-patient facility shall be established.

POSTPROCEDURE CARE

1. Appropriate postanesthesia management shall be provided per ASA Standards for Postanesthesia Care.
2. Recovery and discharge guidelines shall enable patient assessment in a simple, clear, and reproducible manner.
3. Patients who receive medications for sedation or anesthesia (but not local anesthetics alone) shall be discharged with a responsible individual who can ensure the safe transport of the patient to their home.

CONTINUOUS QUALITY IMPROVEMENT

1. Anesthesia personnel should establish a quality review process to identify possible new safety risks and improve care on a regular basis.
2. Periodic emergency response simulations should be performed to review system, communication, equipment, and educational infrastructure.

NORA, non-operating room anesthesia; OR, operating room; PACU, post-anesthesia care unit; MH, malignant hyperthermia; MRI, magnetic resonance imaging; ACLS, advanced cardiovascular life support; BLS, basic life support; PALS, pediatric advanced life support; BMI, body mass index; OSA, obstructive sleep apnea; ASA, American Society of Anesthesiologists

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Recommendations Generated From Multidisciplinary Cohort of Health Care Professionals and Experts

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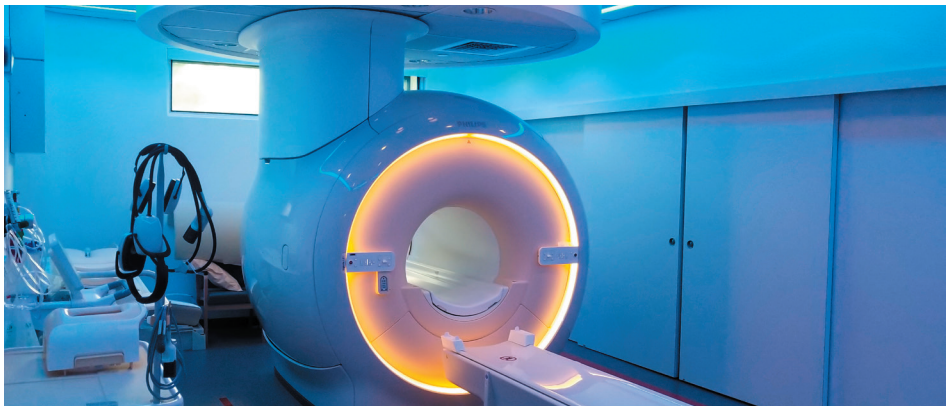
Accordingly, anesthesiology departments have had to retofit what they need for safe anesthetic care into spaces designed for other purposes. NORA locations may be on different floors than the main OR, or even in different buildings, impeding rapid access to additional personnel and equipment in case of emergency. These consensus recommendations establish clear expectations for the facility, including grouping of procedural areas close to one another and the main OR when possible, establishment of scavenging capabilities and adequate oxygen supply, and need for sufficient electrical outlets and lighting to facilitate safe care.

Many NORA locations do not have sufficient equipment to provide safe anesthetic care, which may contribute to patient safety events.[2,10] These recommendations provide standards for facilities to provide emergency airway equipment and capability for rescuing malignant hyperthermia and local anesthetic toxicity, if applicable. The consensus recommendations also provide guidelines for clinician safety; many areas lead clinicians to perform procedures under fluoroscopy. In fact, the anesthesia provider may have radiation exposure equivalent to the proceduralist, and thus, sufficient protection from radiation is required.[11]

In many procedural suites, the proceduralist and nursing team may not be as familiar with working with anesthesia teams. This lack of familiarity may lead to unfavorable team dynamics and the lack of "belonging," which can impede patient safety.[7] Lack of familiarity—both among team members, and with anesthetic procedures and concerns—as well as poor communication, can lead to adverse events in NORA.[1,2,12-14] While the physical space, ergonomics, and location of NORA areas may be more difficult to alter, human factors-related interventions may be easier to implement. Improvements in teamwork and communication are imperative to improving patient safety in these areas and can be facilitated by team training, smaller, more dedicated teams, and shared knowledge about complex cases.



There can be significant production pressure in NORA that can lead to shortcuts. The consensus recommendations advocate for thorough preoperative workup as well as standardized communication before the procedure begins (e.g., formal timeout). Periprocedural monitoring should occur according to standards established by the ASA.[15,16] The recommendations also acknowledge the need for both anesthesia and procedural services to review cases for quality of care, with focus on continuous quality improvement.

There have been other recommendations for how to improve anesthetic care in NORA. Notably, Herman et al[1] published a recent narrative review of safety issues in NORA and used an engineering framework to provide recommendations for improvement. The recommendations presented here differ as they originate from a multidisciplinary cohort of clinicians and health care representatives with extensive expertise in NORA, who, through an iterative process, have provided consensus statements on approaches for the safe conduct of anesthesia in NORA locations. Indeed, these consensus recommendations supplement existing literature and should be used in concert with previous work.

While most general principles were agreed on by the vast majority of conference attendees and experts, the scope of the recommendations generated the greatest amount of discussion and passion during the development process. There was extensive discussion regarding whether to narrow the scope of the recommendations to inpatient only, or if there should be separate recommendations for ambulatory and office-based anesthesia. This is likely a reflection of the diversity of NORA practice, including inpatient, ambulatory, and office practices. In particular, the example of patient harm in pediatric dental cases generated significant discussion.[17] Indeed, patient morbidity and procedural complexity in inpatient locations differ significantly from complexity in outpatient and office-based locations, and there was extensive discussion about whether facility and personnel requirements for inpatient NORA should be required in outpatient or office-based NORA. Some requirements may not be possible—for example, having separate preanesthetic and postanesthetic care areas. The consensus recommendations are the "bare minimum" for safe patient care in NORA and are intended to apply to all NORA locations. Many common patient safety elements apply across the entire NORA population, and the final recommendations were endorsed by clinicians working in inpatient, ambulatory, and office-based NORA.

These recommendations provide a starting point for dedicated anesthesia teams in NORA to improve patient safety, but do not provide strategies for implementation, as these may be specific to both the individual facility and the hospital system. There were several other limitations in the process used to develop the recommendations. First, the content and focus of the conference itself may not fully capture all essential considerations during NORA practice. Second, the final draft of recommendations is

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dependent on the first draft, which was created by a small group of experts, each of whom may have biases regarding NORA best practices. Third, the planning committee members and speakers were predominantly from academic practices, which may bias the content of the recommendations themselves. Fourth, although nonanesthesiology specialties were represented, they were individual specialists and may not be representative of their entire specialties. Fifth, the conference attendees self-selected for the conference and may not be representative of the general medical community. Finally, while significant effort was put forth to create an inclusive and psychologically safe environment for all participants, it is possible that group discussions may have led to suppression of contrary viewpoints and unexpressed opposition or support. The multiround survey and recommendations review process enabled anonymity to other participants; however, the breakout, discussion, and voting sessions of the conference were likely influenced by the public nature of the discourse and understandable reluctance from participants to share opinions openly.

In summary, these recommendations represent another step toward improving patient safety for NORA patients. They are intended to facilitate the reengineering of health care systems in the best interests of the patient so that medical errors are designed out of the NORA component of the system. NORA cases will continue to comprise an ever-increasing portion of anesthetic practice, and clinicians must continue to remain advocates for patient safety.

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