

# Non-Operating Room Anesthesia: Patient Safety, Scheduling, Efficiency and Effective Leadership

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**Basem Abdelmalak, M.D.,FASA**

Professor of Anesthesiology, Departments of General Anesthesiology and Outcomes Research, Cleveland Clinic, Cleveland, Ohio

**Christopher M. Burkle, M.D., J.D.**

Professor of Anesthesiology Department of Anesthesiology and Perioperative Medicine, Mayo Clinic, Rochester, Minnesota

**Alan P. Marco, M.D.,**

Professor of Anesthesiology, Department of Anesthesiology, Ohio State University, Columbus, Ohio

**Donald M. Mathews, M.D.,**

Professor of Anesthesiology and Chair, Department of Anesthesiology, University of Vermont, Burlington, Vermont

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**ABSTRACT:**

Non-Operating Room Anesthesia (NORA) is a practice becoming increasingly established within the broader field of ambulatory care anesthesia. Performing cases outside the traditional hospital based operating room setting has offered not only added conveniences for both patients and proceduralists but has also increased the number of procedures that can now be safely performed in non-OR settings . As a result of this changing trend in practice, anesthesiologists have played a significant role to enter this venue and provide the required anesthesia services for cases once performed in hospital settings. The offering of anesthesia

services for the growing volume and complexity of cases outside the typical support systems found in a hospital or ambulatory surgery center based setting requires a unique set of skills and preparation. This article provides an overview of the common challenges facing anesthesiologists participating in NORA procedures, discusses the minimum requirements for the safe practice of NORA, offers an overview of administrative and regulatory issues impacting NORA, as well as emphasizes the need for anesthesiologists to play an increasingly important role in driving future policy measures surrounding NORA practice.

**Keywords:** non-operating room anesthesia, patient safety

**Introduction:**

Anesthesiologists are increasingly participating to provide anesthesia care to patients undergoing procedures outside of the traditional main operating room setting. This practice

expansion has led to the recognition of a distinct type of anesthesia service known as Non-Operating Room Anesthesia (NORA) that covers a vast array of procedural types [1] (Table 1).

**Table1: Locations for Non-Operating Room Anesthesia (NORA) Services**

Gastroenterology Endoscopy Suite
Interventional Radiology areas including CT
Bronchoscopy Suite
Cardiac Catheterization Lab
Electrophysiology Lab

MRI suite ( Diagnostic, and surgical)
Nuclear Medicine department
Electroconvulsive therapy at PACUs or other locations
Pain Management procedure rooms

The advancement of NORA popularity is largely attributed to advances in the procedures that no longer require the full capabilities of an operating room (such as endoscopic procedures) to perform as well as procedures involving complex and immobile technology (such as interventional radiology). In these settings there is a need for the proceduralist to focus on the intervention, while the depth of sedation or anesthesia needed requires the care of an anesthesiologist. The goal of this article is to describe the challenges facing anesthesiologist participating in NORA procedures, to provide the minimum requirements for safe practice of NORA,

describe administrative and regulatory issues surrounding NORA, as well as suggestions emphasizing the need for anesthesiologists to play an increasingly important role in driving future policy measures surrounding NORA practice.

**NORA Challenges:**

While in the past proceduralists could more easily provide moderate sedation while still performing the primary procedure, the complexity and technological advancement of medical procedures over time has increased requiring a greater need by the proceduralist to focus on the task at hand. Thus, the need for

separate anesthesia services to provide the entire spectrum from moderate sedation to general anesthesia and monitoring has followed. Since existing endoscopy and procedural areas such as interventional radiology suites were built and designed to meet the needs of the procedures and the proceduralists, adding a whole new team (anesthesia) and their equipment becomes a challenge. The anesthesia team is thus often burdened with providing care in non-ideal settings which may hinder the provision of high-quality care as they try to minimize the equipment used to fit the very limited (and often dimly lit) space available. These areas may not have medical gases easily accessible, medical vacuum (suction and scavenging). Often adding to the challenges of care are poor access to the patient and lack of availability of needed medications, supplies, and rescue equipment commonly accessible in the traditional OR environment. Therefore, they have to bring in with them much of the needed supplies and equipment every time they are asked to provide care in those areas. Moreover, the anesthesia practitioner is frequently a "stranger in a strange land" impeding teamwork and resulting in the risk of negative impact on patient care.[2] Often patients have been referred to the proceduralist who is unfamiliar with them and may only know the patient from the patient's medical records. The pre-procedure evaluations available for review by the anesthesiologist may be less thorough

than those performed for patients preparing for surgery in the main operating room. Finally, our proceduralist colleagues often have high (and perhaps unrealistic) expectations; they expect a quiescent, immobile patient (when only varying degree of sedation is needed and provided) with near-instantaneous turnovers.

The issues listed above may lead some to consider providing NORA services in such locations an undesirable service. While many anesthesia groups have decided to evenly divide this "stressful burden" amongst their members in an attempt to avoid professional burnout (personal communications with multiple colleagues around the country), this does not have to be the case. As these changes in patient care are being introduced to our practices it is incumbent upon the anesthesiologist to participate in the planning of such locations starting with the initial meetings for exploring new construction, expansion or remodeling of already existing locations to ensure that patient *and provider* needs are met. Such involvement not only strengthens and helps establish "the team" that will be functioning together when clinical service occur, but will also facilitate communications and set ground rules, expectations, and critical elements that will help such services to grow and provide the highest level of care possible. Table 2 lists some of these challenges and suggested solutions.

Table 2: Sources of Complexity in Nora and Proposed Solutions

Challenge	Description	Solution
Space	Anesthesia is an afterthought, insufficient room for anesthesia machine or supplies, difficult access to patient	Be part of the plan from inception to ensure these areas are designed with dedicated anesthesia space
Equipment	insufficient and outdated equipment are used	Ensure the same equipment standards as in the main operating rooms initial planning involvement to set capital budget for startup
Staff	Proceduralists and their teams are not used to working with anesthesia teams	Effective communication, team building, clear expectations
Patients	High risk patients are served	Establish and optimize the pre-op evaluation process, maintain monitoring standards, develop a formal system for summoning help and designate a nearby recovery room staffed with well- trained nurses.
Procedures	New , complex , more invasive and risky procedures	Effective communications, joint conferences, pre-operative time out, including discussion of procedure details and anesthetic concerns

### Minimal Requirements for Safe Anesthesia in NORA Locations:

To assist its members with such a challenging task of providing NORA services, the American Society of Anesthesiologists (ASA) has issued a statement,[3] listing the minimal requirements for such anesthetizing locations in terms of space, equipment, and personnel as a starting points in the discussions with fellow proceduralists, hospital architects, and administrators to build and design a safe environment for delivering high quality and safe patient care .

### *Space Allocation and Equipment Needs*

- Availability of a reliable oxygen source and delivery method (nasal cannulas, face masks), along with backup supply of oxygen in the form of a full E cylinder
- Availability of adequate suction
- Ability to scavenge waste gases when inhaled anesthetic agents are required
- Presence of a self-inflating resuscitator bag that can administer at least 90% oxygen and deliver positive-pressure ventilation in the event of respiratory distress
- Adequate anesthetic drugs, monitoring equipment, and supplies for the duration of the case

- Adequate lighting and electrical outlets for proper visualization and operation of anesthesia equipment
- Availability of sufficient space for the anesthesia provider and any other necessary personnel, as well as unobstructed access to the patient, anesthesia equipment, and emergency supplies
- Emergency cart with a defibrillator and emergency drugs for cardiopulmonary resuscitation
- Observance of all applicable building codes and facility standards
- Availability of adequately trained staff for immediate assistance of the anesthesia provider, as well as reliable two-way communication with which to request additional assistance
- Provision of adequate postanesthesia care, which should include appropriately trained staff and equipment that ensures safe transport of the patient to the designated recovery area

After these conditions have been met, the anesthesia caregiver can focus on the actual care of patients

#### **Patient Monitoring for NORA:**

It should be emphasized that the same monitoring standards that apply in traditional operating room settings should also be applied to patients served in NORA locations. The importance of patient monitoring during anesthesia has been emphasized by a statement from ASA.[4] The first and most important standard highlighted in that statement is that "qualified anesthesia personnel shall be present in the room throughout the conduct of all general anesthetics, regional anesthetics and monitored anesthesia care". Accordingly, patients are monitored both by clinical observation ("look, listen, feel") as well as by using specialized monitoring equipment. (Table 3)

**Table 3: Monitoring equipment typically employed during an anesthetic.**

Electrocardiogram
Blood pressure ( <i>manual, automatic, arterial catheter</i> )
Pulse oximeter
Capnometer
Oxygen analyzer
Anesthetic agent concentration analyzer
Thermometer (when indicated)
Gas flows/spirometry ( <i>part of anesthesia machine</i> )
Airway pressure monitor ( <i>part of anesthesia machine</i> )
Airway disconnect alarm
Nerve Stimulator ( <i>where muscle relaxants have been used</i> )
Urometer ( <i>measure urine output - where appropriate</i> )
Depth of hypnosis monitor (optional, more so preferred for TIVA)

**Recovery and Discharge Criteria after NORA:**

Anesthetics used in NORA areas should allow rapid recovery as most of these patients are outpatients and have minimally invasive procedures. While each anesthetizing location should develop recovery and discharge protocols that are appropriate for its specific patients and procedures, recovery and discharge criteria should be no different from those used in the main Post Anesthesia Care Unit (PACU).[5] Physicians should be able to assess home readiness in a simple, clear, reproducible manner. Medicolegal ( and safe care) considerations mandate that physicians have documented objective evidence that the patient's discharge criteria were met and that all discharge instructions have been signed by the patient and placed in the medical record.

Patients should be duly informed that home readiness does not confer the ability to drive a car or immediately return to work.

**Monitored Anesthesia Care in the NORA Setting:**

One of the commonly provided anesthesia services in the NORA setting is monitored anesthesia care (MAC). The process of delivering sedation can be complicated: constant vigilance is required as patients can easily descend into deeper planes of sedation than intended. It is not surprising that concerns about patient safety have arisen given the unique issues associated with NORA settings listed above. A report of data from the American Society of Anesthesiology Closed

Claims database found that respiratory depression due to an absolute or relative overdose of sedating agents was responsible for 21% of MAC-related claims and over half of these adverse events were felt to be preventable with better monitoring.[6] When compared to cases occurring in the main operating room, Metzner et al., found that NORA cases were more often associated with patient death, poor ventilation and higher payout to patient for injury than those occurring in the main OR environment.[7] From a recent quality assurance database of approximately 143,000 cases performed at a large academic medical center, 52 patients undergoing moderate sedation had an adverse outcome.[8] The authors reported that over sedation leading to apnea (30/52 patients) and the need for reversal agents (29/52 patients) were the most frequently reported adverse outcomes. The National Anesthesia Clinical Outcomes Registry (NACOR) is also beginning to provide information about NORA safety with data about incidence of complications.[1] Overall mortality was higher in OR patients compared to NORA patients, 0.4 vs 0.2%, respectively. Cardiology and radiology cases had a significantly greater mortality rate of 0.5%. Hemodynamic instability was reported in 0.1% of NORA patients and respiratory complications in 0.09%, both significantly lower than rates reported in the OR data.

It is clear from the discussion above that respiratory inadequacy in the NORA patient is a significant concern. Hypoventilation, apnea and hypoxemia are the principal causes of sedation-related morbidity. [9] These risks are

less significant among moderately sedated patients but increase with levels of deep sedation. Moreover, doses of sedating medications that are sub-hypnotic can result in significant pharyngeal dysfunction.[10] When patients move from states of consciousness to states of unconsciousness their genioglossus nerve shows a significant decrease in EMG activity potentially causing airway obstruction.[11] Ventilatory monitoring is therefore an essential component in assuring safety of the sedated patient and is being proposed to be used in PACUs to ensure that the patient has recovered sufficiently.

Clinical observation of ventilation has been shown to be unreliable in assessing respiratory status.[12] Pulse oximetry is inadequate as a monitor of ventilation as well. While it can detect arterial oxygen desaturation (as a consequence of hypoventilation) it does not reflect alveolar ventilation with sufficient sensitivity. With the provision of supplemental oxygen, pulse oximetry will be even slower to detect alveolar hypoventilation during respiratory depression.[13] Some have therefore suggested withholding supplemental oxygen so that a decrease in oxygenation will herald inadequate ventilation.[14] However, withholding oxygen in the setting of both inadequate ventilation and hypoxemia is likely to be more harmful than inadequate ventilation alone.

Because of the lack of sensitivity of both routine observation and pulse oximetry to detect inadequate ventilation, it is advisable to employ other types of ventilation monitoring such as



capnography, chest wall impedance techniques and monitoring of acoustic signals.

Capnography has been shown to be associated with earlier detection of ventilatory depression compared to pulse oximetry alone in patients receiving sedation and should be used whenever technically possible.[15] In addition, interventions based on capnography compared to care relying only on a pulse oximeter are associated with decreased episodes of hypoxemia and apnea.[16] A meta-analysis by Waugh et al. concluded that utilization of capnography is associated with a significantly greater rate of detecting episodes of ventilatory depression compared to routine monitoring.[17] In 2011 the ASA amended its Standards for Basic Anesthetic Monitoring to recommend end-tidal carbon dioxide monitoring during moderate and deep sedation.[4] However, not all studies have demonstrated a benefit of using capnography. Van Loon and colleagues found that patients undergoing minor gynecologic procedures who did not receive supplemental oxygen had no difference in the incidence of hypoxemia whether capnography was or was not used.[18] In a small study of gastroenterologist-administered moderate sedation for colonoscopy without supplemental oxygen, no difference in the incidence of hypoxemia was seen when comparing patients with and without capnography.[19] It thus seems that some of our non-anesthesiologist colleagues who administer moderate sedation are not yet convinced of the utility and value added of capnography use in these patients. However,

capnography is more realistic and practical for earlier detection of apnea.

Other respiratory monitoring modalities have also been described including analyzing breath sounds at the larynx. While low-technology devices such as a precordial stethoscope placed at the sternal notch may be used in this fashion, one commercial monitor has been described: the rainbow Acoustic Monitor™ (Masimo Inc., Irvine, California, United States). During sedation, when compared to capnography this technology demonstrated a similar ability to detect respiratory pauses with a decreased frequency of false alarms.[20] In the post anesthesia care unit acoustic monitoring improved sensitivity in detecting respiratory pauses compared to capnography.[21] However, using respiratory rate alone may miss a significant number of situations of decreased minute ventilation.[22] Another approach is to monitor impedance changes in the chest wall during ventilation. The Respiratory Volume Monitor (RVM, Respiratory Motion Inc., Waltham, Massachusetts, United States) has been designed to help eliminate false positives during respiratory attempts with a closed glottis.[23] In one study, the RVM detected hypoventilation better than capnography in patients undergoing colonoscopy.[24] Ultimately, more research is required to determine the best method to assure adequate ventilation during NORA sedation.

### Emerging Issues with Anesthesiologist-Administered Propofol Sedation:

While anesthesiologists believe that they are augmenting patient safety and contributing to improved clinical outcomes when they provide sedation for NORA procedures, there have been some recent reports that challenge this assumption. Cooper et al. reviewed a 5 percent sample of patients from a Medicare database who underwent diagnostic colonoscopies from 2000-2009 and found that those with anesthesia billing codes had a higher rate of aspiration pneumonia.[25] Utilizing a larger administrative claims database, investigators examined outcome codes for 30 days following colonoscopy in 3,168,228 patients aged 40-64 years of age between 2008 through 2011.[26] The use of anesthesia service was associated with a 13% increase in the risk of any complication within 30 days along with an increased risk of perforation, hemorrhage, abdominal pain, complications secondary to anesthesia and stroke. Another study utilizing the Clinical Outcomes Research Initiative National Endoscopic Database, a network of 84 sites in the United States, found no difference in serious adverse events in the colonoscopy patients, but a significantly greater incidence in the upper endoscopy patients when anesthesia personnel were involved, particularly in ASA I and II patients.[27] Important to remember however is that many of these studies suffer from the problems of using billing data to reflect clinical outcomes, lack of risk adjustment and lack of randomization. Despite this, editorials in the GI literature are sharply questioning the value of anesthesiology involvement in the GI NORA area.[28]

It is an interesting moment in the evolution of NORA care. With the recent decision by Johnson and Johnson (New Brunswick, New Jersey) to discontinue sales of the Sedasys® system, it is entirely possible that another “disruptive technology” might emerge. The limited data published about Sedasys® demonstrated very high patient and provider satisfaction from a system that claimed to deliver mild to moderate sedation.[29] Head-to-head comparison of automated sedation to anesthesiology-administered sedation has not been published. In addition, the assumption that anesthesiologist-provided care (often deep sedation or general anesthesia with a natural airway) is safer is being challenged by studies such as those presented above. At the moment, what we believe to be true- that anesthesiologist-delivered sedation for NORA is a safe practice and beneficial to patients- is yet to be documented through a rigorous prospective trial.

### Economic Efficiency and Regulatory Compliance:

NORA can have significant impact on resource utilization, especially of “human capital”. In physician anesthesiologist only practices, staff assignments for NORA can be considered much like any other location, but when working in the anesthesia care team model or when supervising resident physicians, billing and accreditation rules can make scheduling more complex. Because of billing rules for medical direction, having scattered remote sites causes economic inefficiency. For example, a hospital-based endoscopy suite with one room is suitable for a physician anesthesiologist

providing care solo but if practicing in the Anesthesia Care Team model (with nurse anesthetists, or anesthesiologist assistants, for simplicity they will both be referred to as anesthetists), the anesthesiologist needs to be directing at least three concurrent locations to be economically feasible. An attending anesthesiologist can medically direct up to two locations with a combination of resident physicians and anesthetists (a residency accreditation standard) or up to four anesthetists (or combination of anesthetists and residents) if they are co-located within a procedure suite (a billing compliance standard). However, interventional radiology suites are often single settings and with the complexity of procedures being performed in them, the anesthesia team often becomes inefficient by having a single physician and either an anesthetist or resident on the anesthesia team. Typically, these suites are geographically remote from the operating rooms, often on separate floors or wings, making it a challenge to meet the "remain immediately available" criterion for medical direction. If the interventional radiology suite has multiple procedure rooms that can be shared by several services such as radiology, neurology, and cardiology, it is possible to have more efficient use of anesthesia services by having the physician anesthesiologist direct the care for simultaneous cases in interventional suites. For smaller facilities, designing a multiservice suite will likely improve its overall utilization and for large quaternary referral centers, each specialty might have enough case volume to justify a dedicated suite with the ability to conduct

multiple concurrent procedures. Encouraging a facility to construct procedure suites that can be utilized by several specialties improves the operational and economic efficiencies for both the providers and the facility. Horizontal expansion into more simultaneous anesthetizing sites, while appearing to be a satisfier for proceduralists, can lead to apparent decreases in anesthesia productivity when measured as encounters per site per year yet burden the anesthesiology group with the need to hire additional providers.[30] This may result in the anesthesiology group looking to the facility to share some of their profit from such procedures to support these economically inefficient (from the anesthesia service stand point) programs.

#### **Scheduling of Anesthesia Services:**

For services that have sufficient volume, scheduling dedicated time (block time) may improve utilization and ensure that unassigned time (open time) is filled sequentially will improve financial productivity.[31] Scheduling full days, whether 8, 10, or 12 hours long, rather than partial days of coverage should improve efficiency; for lower volume services this may mean having a long day every other week rather than shorter blocks every week. An economic goal is to reduce over utilized time, which is more expensive (due to both the cost of paying overtime and the effects on morale) than underutilized time.[32] If the case volume supports a longer block, it is better to schedule a long day of ten or twelve hours and be transparent on expectations than to schedule anesthesia services for eight hours and routinely

run over which is a major staff dissatisfier. Scheduling of patients requiring anesthesia services outside of the operating room can often be cumbersome (not including patients cared for in a hospital setting requiring minimal or moderate sedation administered by the proceduralist). Scheduling should be integrated into the electronic system used for the operating rooms to ensure appropriate assignments and enterprise-wide scheduling is more convenient for the proceduralist and patient, and can improve coordination of appointments and instructions.[33]

#### **Provider Issues:**

Other aspects of human capital need to be considered. Do the personnel assigned to NORA enjoy working in those environments? If not, and NORA is seen as a chore, the reduction in job satisfaction caused by such an assignment can lead to increased staff turnover with its significant inherent costs of recruitment and training.[34, 35] It has been estimated that recruitment and training costs average 1.5 times the annual salary of highly skilled employees, so increased turnover has a significant economic impact even beyond the ability to provide patient care.[36] Non-technical skills (task management, team working, situation awareness, and decision making) while important to all anesthesiologists, are particularly important in NORA and selection and potential assessment of staff involved in NORA for these skills can be accomplished.[37]

#### **NORA Leadership and the Important Role of the Anesthesiologist:**

Leadership in developing a NORA program does not end with identifying sites and settling on staffing models. One of the biggest causes of medical harm is problems with communication.[38] Communication issues in the NORA environment potentially lie in three major domains: between the anesthesia care team and procedure suite staff; between the anesthesia care team and the proceduralists; between the anesthesia care team and other anesthesia providers. Communication between the anesthesia team and the procedure suite team in NORA locations can be critical. This may be because of hazards of the local setting such as ionizing radiation exposure or the impact of magnetic fields that produce a direct hazard to the providers or patient, or it may concern support for the anesthesia providers themselves. However, NORA presents a setting where many of the factors impeding effective information transfer are rampant, including high-acuity settings such as the Operating Room and information sharing across professional boundaries.[39] A request to the circulating nurse in an operating room to apply cricoid pressure or hand a mask is reasonably expected to be fulfilled as required. However, asking the procedural technician to “hand me the mask” might be met with a blank stare or the wrong item (facemask for ventilation, personal protective equipment, or even masking tape) because of the lack of knowledge about anesthesia needs in that group. The educational level of nurses has increased over time with the majority now

holding at least a bachelor's degree in nursing;<sup>[40]</sup> however, the technical staff in a specific area, such as radiology may not be nurses and may have limited general medical training.

Communication between the physician anesthesiologist and the proceduralist is also crucial. Clearly understanding the proposed procedure and likely events is important in all anesthetics. In NORA, patient selection and preoperative discussions of special issues is crucial. While the proceduralist might be more comfortable performing the case in, say, the endoscopy suite, patient factors might influence whether or not the case should be done in a remote setting without the support available in a standard operating theater. For example, a critically ill patient with the need for specialized invasive monitors might be better supported in the operating room; it is up to the anesthesiologist to negotiate with the proceduralist to balance whose specialized equipment and support structures are most portable in those cases. If the procedure must be done in the remote site (such as interventional neurology requiring specific imaging equipment with specialized software packages), careful planning beforehand can offset many of the risks of working in the remote environment.

Lastly, in developing a NORA program or site, the physician anesthesiologist leaders should develop plans for assistance when needed. In traditional operating rooms it is common to have an overhead paging system with which

one can call for "any anesthesiologist" to assist and have a reasonable expectation that those not personally providing anesthesia care would respond. In remote locations, how does the anesthesia team call for help? This can range from needing more labels for medications to a critical event. Activating a "code blue" may get people there, but the "code team" is unlikely to be familiar with the needs and issues of a patient under anesthesia. And, what if something more specific is needed, such as help with an unexpected difficult intubation? Having a radio, mobile phone, or other system in place and having educated the non-OR staff on how to activate the help system can be life-saving for the patient and certainly would reduce stress and difficulties for the anesthesiologist. Setting in advance how to summon help and who will respond is an important leadership function.

Customer satisfaction is always an important issue. As anesthesiologists providing NORA services, identifying the customer is critical. The patient, first and foremost, is our customer and ensuring a safe, effective, and timely anesthetic should be our primary goal. Appropriate pre-procedure evaluation and addressing the concerns of the patient/patient's surrogates and family will go a long way toward satisfying this customer. Another customer is the proceduralist. While the proceduralist has many drivers such as competing duties, consults, clinic patients to see, etc., ultimately s/he has the same goal in mind- caring for the patient. Communication with these other physicians will go a long way towards not only improving care,

but also achieving higher levels of satisfaction. Lastly, the third customer is the hospital administration. They want timely and efficient provision of services resulting in improved patient outcomes. Anesthesiologists should take the lead in designing processes for NORA that help satisfy all customers. One option for improving patient, proceduralist, and hospital administrator satisfaction is to have a "service guarantee" such as agreeing that NORA cases will be accommodated within a two-week window of the request. This differs from block time in that the anesthesiology group is committing to offering a time, not a specific time within that window.

Another major leadership entity in NORA concerns the anesthesiologist oversight over procedural sedation provided by the proceduralists as mandated by CMS as a condition of participation. Anesthesiologists' presence in NORA would facilitate such service, and strengthen their relationship with the procedural sedation teams with the goal of enhancing patient safety and outcomes. Moreover, the anesthesiologists practicing in NORA will need to be in charge or at least playing a major role in crafting the policies and procedures that govern NORA services.

### **NORA and Changes in the US Health Care System:**

A looming issue is how do we as anesthesiologists adapt NORA in the move towards value-based purchasing of health care and population health. Publicly reported performance measures are more frequently

including cost as a measure and with more patients having health care coverage under high-deductible plans, the out-of-pocket cost can be a significant driver of where patients receive care. Under current fee for service payment systems, NORA cases may not decrease the charges from hospitals because of their reliance on Diagnosis Related Codes (DRG) and Ambulatory Procedure Codes (APC) for billing, but increased use of NORA might expand capacity and reduce length of stay, helping health care systems meet the triple aim of improving the health of their patients through faster service, enhancing patients' experience and outcomes when receiving care, and reducing the total cost of care. Since some procedures (dental, endoscopy) do not need the sterile environment of an operating room, facilities may be able to provide these services in facilities that cost less to build and maintain. How empty hospitals are (by reducing length of stay and need for admission) is an indicator of how successful the health care system is at achieving the triple aim.[41] Under population health, proceduralists become cost centers rather than revenue centers to the facility. That is, the facility would no longer look to the proceduralist as one who brings in dollars but rather someone who is spending health care premium dollars that would otherwise flow to the facility's bottom line. Anesthesiologists need to position themselves as leaders in how to meet that triple aim of health care.

### **Conclusion:**

The future of NORA is bright and as more minimally invasive procedures replace

conventional surgeries, the demand for the anesthesiologist’s role outside the operating room will likely continue to expand.[42] As a result, anesthesiologists should embrace, own and take leadership of this changing landscape of this anesthesiology practice. Following standard policies and procedures will ensure that our non-operating room patients receive the same high standard of care that is available

to them in the operating room. Successful and safe delivery of NORA will be enhanced by achieving the goals presented in Table 4. Improved knowledge from much needed evidence based research will also enable us to strengthen our efficiency in this arena and accommodate the growing number of patients and specialists requiring our services well into the future.

**Table 4. The 8 effective habits for successful NORA**

1	Improvement in pre-procedure evaluation
2	Improvements in scheduling
3	Adequate anesthesia equipment and reliable support
4	Development of database for clinical outcomes
5	Improved billing for anesthesia services
6	Identification and formalization of leadership (anesthesiologists, proceduralists, nurses)
7	Involvement of anesthesia in procedural ( moderate) sedation
8	Improvement in NORA PACUs

Adopted with permission from Dr. Walter Maurer, MD, Emeritus President of the Society for Ambulatory Anesthesia (SAMBA)

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