CHAPTER – 11

Frailty and anesthesia outside operation theatre

Background:

Non-operating room anesthesia (NORA) refers to the delivery of sedation/anesthesia to patients undergoing painful or unpleasant procedures outside of the operating room.[1] Technological advancements in medical equipment, physician proficiency, and medically compromised patients, have all increased the need for these procedures and thus, are becoming more common. Radiology, gastrointestinal imaging, diagnostic/therapeutic interventions, paediatric cardiac catheterization, mental care, and dentistry are all common procedures. Anesthesiologists are regularly asked to give NORA at these remote areas, but they often overlook the necessity of maintaining safety standards for equipment, employees, and facilities. Despite the fact that there are several studies on anaesthetic use in remote places, high-quality studies are limited.

It is critical for anesthesiologists to build a systemic, uniform framework throughout an institute that encompasses all provisions of all categories of anesthetic treatment in order to deliver safe and quality anesthetic care in the NORA. Such standards must be implemented consistently throughout the hospital, not just to protect patients but also to protect health-care workers. Because anesthesiologists doing NORA are responsible for the patient's as well as their own safety, these guidelines should not be overlooked.

Risks associated with NORA:

NORA presents a number of specific obstacles, including those relating to the patient, technique, and surroundings.

Patients undergoing treatments utilizing new and complex technical equipment are at higher risk, if handled by physicians who are inexperienced with NORA. Pediatrics, geriatrics, and medically compromised patients who are too weak for surgical management but can benefit from a procedure are among these patients. [2]

Regardless of how simple the treatments (or surgeries) conducted by NORA are, each patient should be prepared for general anesthesia (GA) because sedation can be switched to general anesthesia at any time. The anesthesiologist must comprehend the process's nature, including the patient's position, the procedure's pain level, and the duration of the procedure. In addition, contingencies for emergencies and negative outcomes must be discussed with the proceduralist ahead of time. Other employees must be trained to help or do cardiopulmonary resuscitation.[3] Patients and anesthesiologists are both at danger in emergency scenarios due to unfamiliar surroundings, absence of monitoring devices, improperly trained or insufficient staff, and unavailable medication or equipment. To improve the quality of patient treatment, the American Society of Anesthesiology (ASA) has issued minimal recommendations for anaesthesia in the non-operating room. [4]

Table 1: Guidelines for Non-operating Room Anesthesia [4]

Each location should have

- Reliable source of oxygen adequate for the length of the procedure, with a backup supply
- Adequate and reliable source of suction
- Adequate and reliable system for scavenging waste anesthetic gases
- Self-inflating hand resuscitator bag capable of administering > 90% oxygen

- Adequate anesthesia drugs, supplies, and equipment for the intended anesthesia care
- Adequate monitoring equipment to allow adherence to the "Standards for Basic Anesthetic Monitoring"
- Sufficient electrical outlets to satisfy anesthesia machine and monitoring equipment requirements

Provision for adequate illumination

- The patient, anesthesia machine, and monitoring equipment
- Battery-powered illumination other than a laryngoscope immediately available

Sufficient space

- Accommodate necessary equipment and personnel
- Allow expeditious access to the patient, anesthesia machine, and monitoring equipment

Immediate availability of an emergency cart

- Defibrillator, emergency drugs, and other equipment to provide cardiopulmonary resuscitation

Staff

- Trained anesthesiologist

NORA and frailty:

NORA services have become common for frail patients as well as patients with serious comorbidities as the number of operations and interventional procedures performed in offices and ambulatory facilities has increased. According to registry data from the United States, the number of patients undergoing office-based procedures in ASA classes 4–5 grew from 19.3 to 32.8% between 2010 and 2014.[5]

NORA can be used on patients who are too sick to be considered for surgery as well as the general public undergoing diagnostic tests. According to NORA's closed claims study, the majority of the patients were elderly. [6]61% of individuals were classed as ASA 3 to 5, and 38%

were above the age of 70. It's worth noting that monitored anaesthetic care claims were more closely related with older and frail patients than GA claims. [7] Another closed claims analysis of 13 patients found that the anaesthetic risk increases significantly in patients with an ASA rating higher than 1, implying that patients desiring NORA should be thoroughly examined before receiving anesthesia/sedation. [8]

Anesthesiologists should be mindful that administering anaesthesia or sedation outside of the operating room raises the risk of complications. Operator error or lack of rescue systems is the most typical causes of near misses or critical occurrences. [9] In NORA settings, insufficient or inadequately trained workers can also pose serious difficulties. Even if an anesthesiologist is present, if workers in the radiology or endoscopy departments are unfamiliar with anaesthetic or cardiovascular resuscitation, the rate of morbidity and mortality will rise. The anesthesiologist must verify that all participants are properly trained in both anaesthesia and cardiopulmonary resuscitation before beginning NORA.

Frailty index before NORA procedures:

Frailty is a stress-related syndrome in which the body's physiological balance is disrupted and health is deteriorated. In many therapeutic settings, frail individuals have a higher risk of postoperative complications. However, more recent research has focused on the link between frailty and quality indicators like failure to rescue (death following a possibly preventable problem) and hospital readmissions, both of which are more common in frail people.[10, 11]

Frailty Index, Surgical Complexity Score and Revised Cardiac Risk and could be used together with ASA classification in preoperative risk assessment of comorbidities. [12, 13] Amongst the frailty indices, The Risk

Analysis Index (RAI) is a validated frailty assessment tool that can predict postoperative death at 30-, 180-, and 365 days that can be employed to evaluate the severity of frailty before commencing the NORA procedures.[13, 14]

Table 2: Variables of Risk Analysis Index

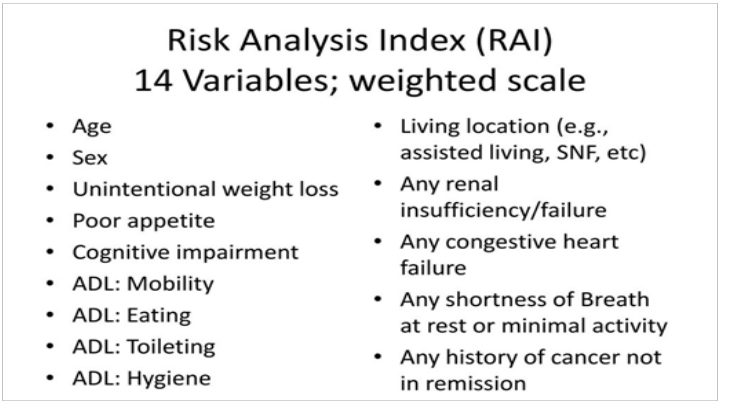
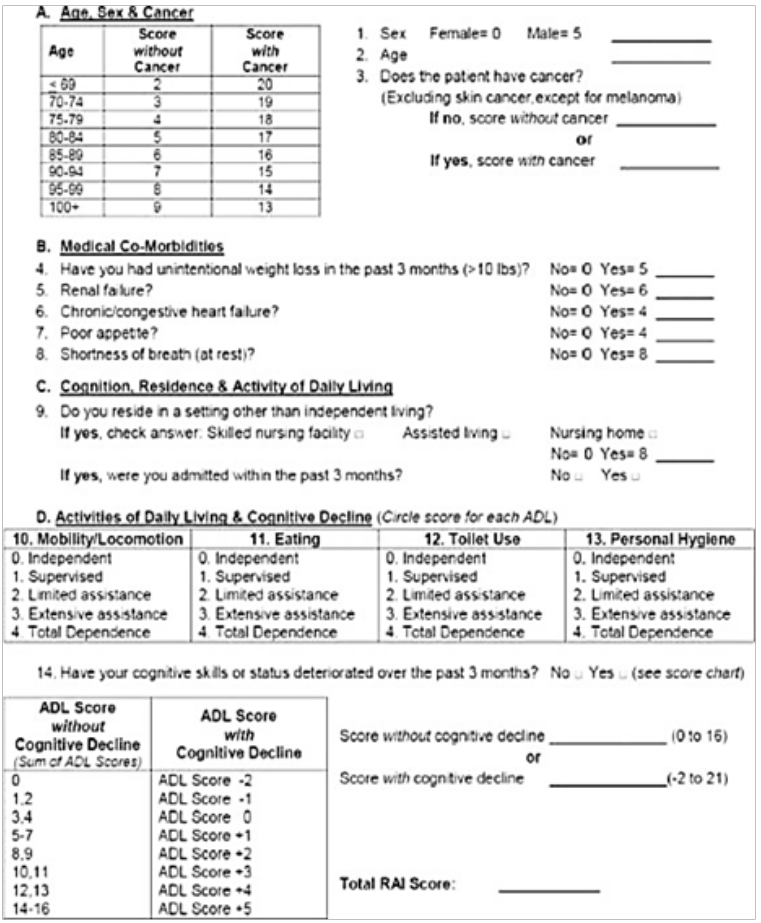


Figure 1: Assessment of frailty using Risk Analysis Index (RAI)



A. Age, Sex & Cancer

Age	Score *without* Cancer	Score *with* Cancer
< 69	2	20
70-74	3	19
75-79	4	18
80-84	5	17
85-89	6	16
90-94	7	15
95-99	8	14
100+	9	13

1. Sex Female= 0 Male= 5 _____
2. Age _____
3. Does the patient have cancer?
   (Excluding skin cancer,except for melanoma)
   If no, score *without* cancer _____
   or
   If yes, score *with* cancer _____

B. Medical Co-Morbidities

4. Have you had unintentional weight loss in the past 3 months (>10 lbs)? No= 0 Yes= 5 _____
5. Renal failure? No= 0 Yes= 6 _____
6. Chronic/congestive heart failure? No= 0 Yes= 4 _____
7. Poor appetite? No= 0 Yes= 4 _____
8. Shortness of breath (at rest)? No= 0 Yes= 8 _____

C. Cognition, Residence & Activity of Daily Living

9. Do you reside in a setting other than independent living?
   If yes, check answer: Skilled nursing facility ☐ Assisted living ☐ Nursing home ☐
   No= 0 Yes= 8 _____
   If yes, were you admitted within the past 3 months? No ☐ Yes ☐

D. Activities of Daily Living & Cognitive Decline (*Circle score for each ADL*)

10. Mobility/Locomotion	11. Eating	12. Toilet Use	13. Personal Hygiene
0. Independent	0. Independent	0. Independent	0. Independent
1. Supervised	1. Supervised	1. Supervised	1. Supervised
2. Limited assistance	2. Limited assistance	2. Limited assistance	2. Limited assistance
3. Extensive assistance	3. Extensive assistance	3. Extensive assistance	3. Extensive assistance
4 Total Dependence	4. Total Dependence	4. Total Dependence	4. Total Dependence

14. Have your cognitive skills or status deteriorated over the past 3 months? No ☐ Yes ☐ (*see score chart*)

ADL Score *without* Cognitive Decline (*Sum of ADL Scores*)	ADL Score *with* Cognitive Decline
0	ADL Score -2
1,2	ADL Score -1
3,4	ADL Score 0
5-7	ADL Score +1
8,9	ADL Score +2
10,11	ADL Score +3
12,13	ADL Score +4
14-16	ADL Score +5

Score *without* cognitive decline _____ (0 to 16)
or
Score *with* cognitive decline _____ (-2 to 21)

Total RAI Score: _____

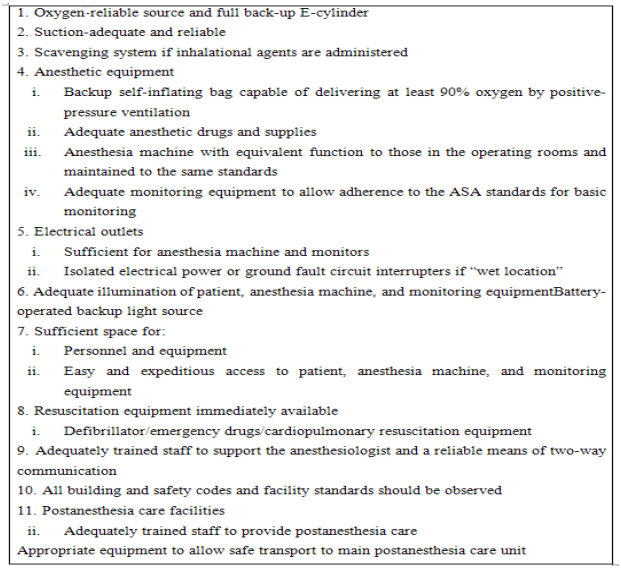
These metrics, unlike comorbidity indexes, take into account functioning, disease condition, past treatments and procedures, as well as anesthesia-related aspects. They can be simply generated and calculated electronically, even from medical records. It would be fascinating to see whether they could help with risk assessment prior to surgery. None of these tools, however, incorporates information on concomitant conditions, NORA settings, staff experience, and anaesthetic resources. Naturally, the location of NORA is important: a surgical unit in a downtown office, for example, is significantly different from one at a university hospital.[3]

Preparing for non-operating room anesthesia:

It is critical to emphasise that the necessary comorbidity care should be provided in NORA as well. Prior to NORA, it is critical to determine the number of comorbidities including frailty as well as their pathophysiological status. The team should be taught to keep key functions running smoothly, offer proper monitoring, and treat comorbidities as needed. In addition, the care should be extended to include a recovery period as well as transportation back to the patient's home. NORA-service providers must also be prepared to deal with potential comorbidity-related emergencies, such as intubation difficulties. Regrettably, there is relatively little evidence for disease-specific care in NORA. [13]

In order to achieve this, the triad of NORA must be kept in mind before starting the procedure (Figure 2). [15]

Figure 2: Triad of NORA


1. Oxygen-reliable source and full back-up E-cylinder
2. Suction-adequate and reliable
3. Scavenging system if inhalational agents are administered
4. Anesthetic equipment
   i. Backup self-inflating bag capable of delivering at least 90% oxygen by positive-pressure ventilation
   ii. Adequate anesthetic drugs and supplies
   iii. Anesthesia machine with equivalent function to those in the operating rooms and maintained to the same standards
   iv. Adequate monitoring equipment to allow adherence to the ASA standards for basic monitoring
5. Electrical outlets
   i. Sufficient for anesthesia machine and monitors
   ii. Isolated electrical power or ground fault circuit interrupters if "wet location"
6. Adequate illumination of patient, anesthesia machine, and monitoring equipmentBattery-operated backup light source
7. Sufficient space for:
   i. Personnel and equipment
   ii. Easy and expeditious access to patient, anesthesia machine, and monitoring equipment
8. Resuscitation equipment immediately available
   i. Defibrillator/emergency drugs/cardiopulmonary resuscitation equipment
9. Adequately trained staff to support the anesthesiologist and a reliable means of two-way communication
10. All building and safety codes and facility standards should be observed
11. Postanesthesia care facilities
   ii. Adequately trained staff to provide postanesthesia care

Appropriate equipment to allow safe transport to main postanesthesia care unit

The patient:

For a variety of reasons, patients may require sedation or anaesthesia to withstand NORAprocedures. Frail patients and patients who are too ill to tolerate a major surgical treatment but may be able to have a palliative, less invasive procedure are likewise a dilemma for the NOR anesthesiologist. All NORA patients require a thorough pre-anesthetic evaluation and the preparation of a competent anaesthetic plan with adequate monitoring levels.

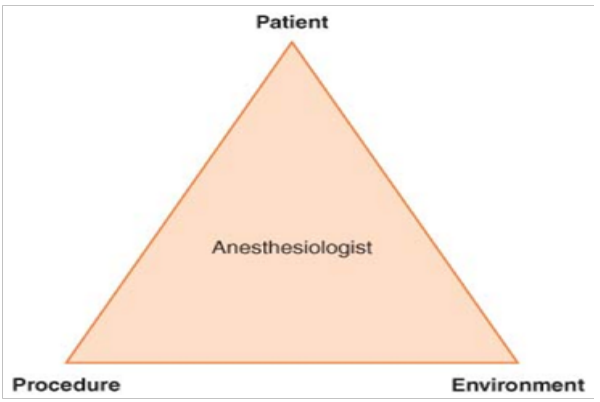
The procedure:

The following are some of the most common NORA procedures for which the patient may require anaesthesia or sedation. The anesthesiologist must comprehend the process's nature, including the patient's position, the

procedure's pain level, and the duration of the procedure. The best anaesthesia plan ensures that the patient is safe and that the process runs smoothly. Contingencies for crises and negative results must be discussed with the proceduralist.

- **Patient Factors Requiring Sedation or Anesthesia for Non-operating Room Procedures:**[15]
- Claustrophobia,
- Anxiety and panic disorders
- Cerebral palsy, developmental delay and learning difficulties
- Seizure disorders, movement disorders and muscular contractures
- Pain, both related to the procedure and other causes
- Acute trauma with unstable cardiovascular, respiratory, or neurologic function
- Raised intracranial pressure
- Significant comorbidity and patient frailty (ASA grades III, IV), child age, especially children <10 yrs

Table 3: ASA Standards for NORA Locations [16]



Summary:

Regardless of where the procedures will be performed, the pathophysiological conditions of various comorbidities including frailty should be carefully reviewed and a risk assessment completed prior to surgery. The amount of comorbidities as well as the patient's functionality is crucial. NORA guidelines for numerous comorbidities, such as frailty, COPD, diabetes, and so on, were recently published and are highly important tools, but they will not eliminate the necessity for institutional protocols. It is essential to assess the frailty score through RAI before starting the NORA procedures and exceptional post-procedural care is also mandated.

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