

Defining NORA: Introducing Safety Concerns

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Objectives

- Define NORA
- Enlist sources of complexity in NORA
- Outline safety issues related to sedation and anesthesia in NORA

Conflict Of Interest Disclosure

- Consultant and Speaker – Medtronic and Acacia Pharma
- Past-president, Society for Ambulatory Anesthesia (SAMBA)



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Non-Operating Room Anesthesia (NORA)

- Any **anesthesia service** provided in a location (procedure room, CT/MRI suite, etc.,) outside the main operating room pavilion
- Old terms:
 - “Remote” Anesthesia
 - Out of Operating Room Anesthesia (OORA)
- NORA is **NOT Procedural Sedation**

Locations for NORA Services

- Gastroenterology Endoscopy Suite
- Interventional Radiology areas including CT
- Bronchoscopy Suite
- Cardiac Catheterization Lab
- Electrophysiology Lab
- MRI (diagnostic, and surgical)
- Nuclear Medicine
- PACU (Electroconvulsive therapy)
- Pain Management procedure rooms

NORA in the ICU

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Non-operating room anesthesia in the intensive care unit

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Why Did NORA Exist? Safety Concerns?

- New advances in the procedures:
 - Not requiring the full capabilities of an operating room
 - Requiring complex and immobile technology
- Higher risk patients who were not previously considered candidates for any intervention, now have an option
- Economic trend (pressure) for more outpatient vs. inpatient services
- Procedural sedation Vs. Anesthesia services

Growth of Nonoperating Room Anesthesia Care in the United States: A Contemporary Trends Analysis

Alexander Nagrebetsky, MD, MSc,* Rodney A. Gabriel, MD,† Richard P. Dutton, MD, MBA,§ and Richard D. Urman, MD, MBA‡

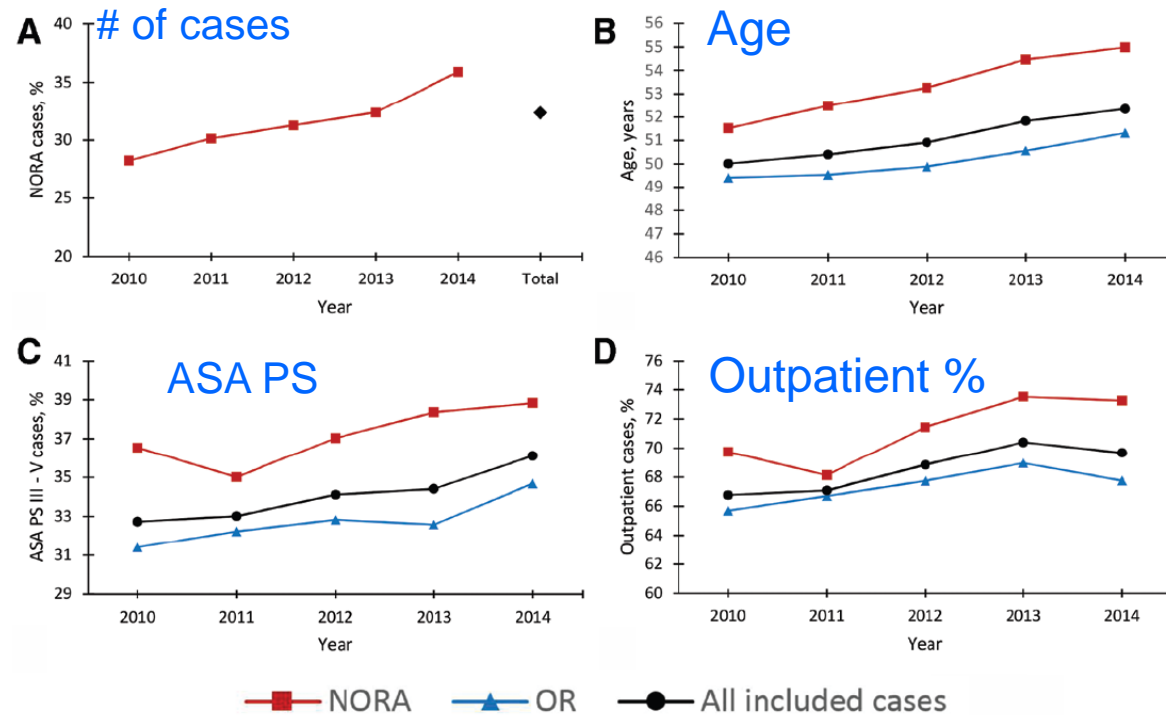


Figure 2. A, Percent of nonoperating room anesthesia (NORA) cases among all cases included in this study. B, Mean age of patients. C, Percent of cases performed in patients with American Society of Anesthesiologists physical status (ASA PS) III–V. D, Percent of outpatient cases.

Sources of Complexity and Challenge In NORA

- **Space:** B. Dunworth, CRNA
- **Equipment and Monitoring**
- **Staff:** D. Anca, MD and J. Cooper, PhD
- **Patients:** B. Sweitzer, MD; F. Shapiro, MD
- **Procedures:** R. Agarwal, MD



Challenges in GI NORA

- Monitoring ventilation
- Airway management
- NPO status
- CO₂ Bowel insufflation

EGD For LVAD Patients

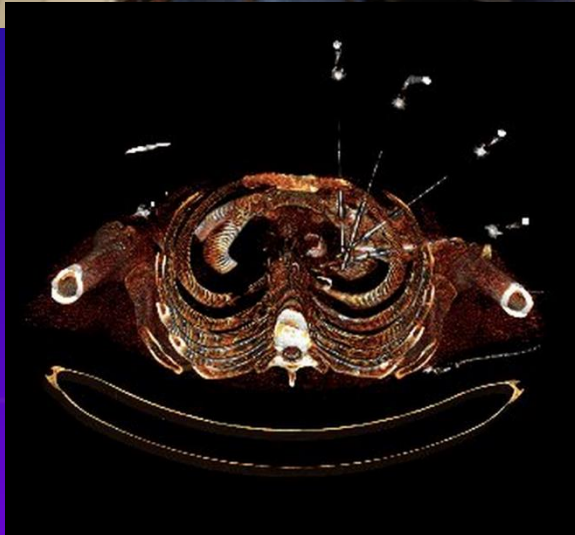
- Increased need due to acquired VW
- Pulsatile Vs non pulsatile
- Pump flow and pulse index



Other Challenges

- Hypovolemia from bowel prep
- Uncorrected anemia from GI Bleed
- Bradycardia, and/or arrhythmia from bowel distension, or scope insertion
- Other complications:
 - Bleeding
 - Perforation
 - Aspiration

Challenges of Lung Cancer Cryoablation



Patient Safety in NORA

- 12 M NACOR patients from 1500 facilities
- NORA patients were older
- MAC is more common in NORA
- Most common minor complications: PONV, and pain
- Hemodynamic instability was reported in 0.1% of NORA patients
- Respiratory complications in 0.09%,

Patient Safety in NORA

- Overall mortality was greater in OR patients compared to NORA patients, 0.4 vs 0.2 %, respectively
- The cardiology and radiology areas had a mortality rate significantly greater than the OR of 0.5%
- Wrong patient/side procedures were higher in NORA

Patient Safety in NORA

- Closed claims study
- In MAC cases, respiratory depression was responsible for 21% MAC-related claims
- Over half of these adverse events were felt to be preventable with better monitoring¹
- Compared with OR claims, those in the NORA locations are more often associated with patient death, issues with ventilation and higher payout²

1. Bhananker SM, Posner KL, Cheney FW, Caplan RA, Lee LA, Domino KB. Injury and liability associated with monitored anesthesia care: a closed claims analysis. *Anesthesiology*. 2006;104(2):228-34.

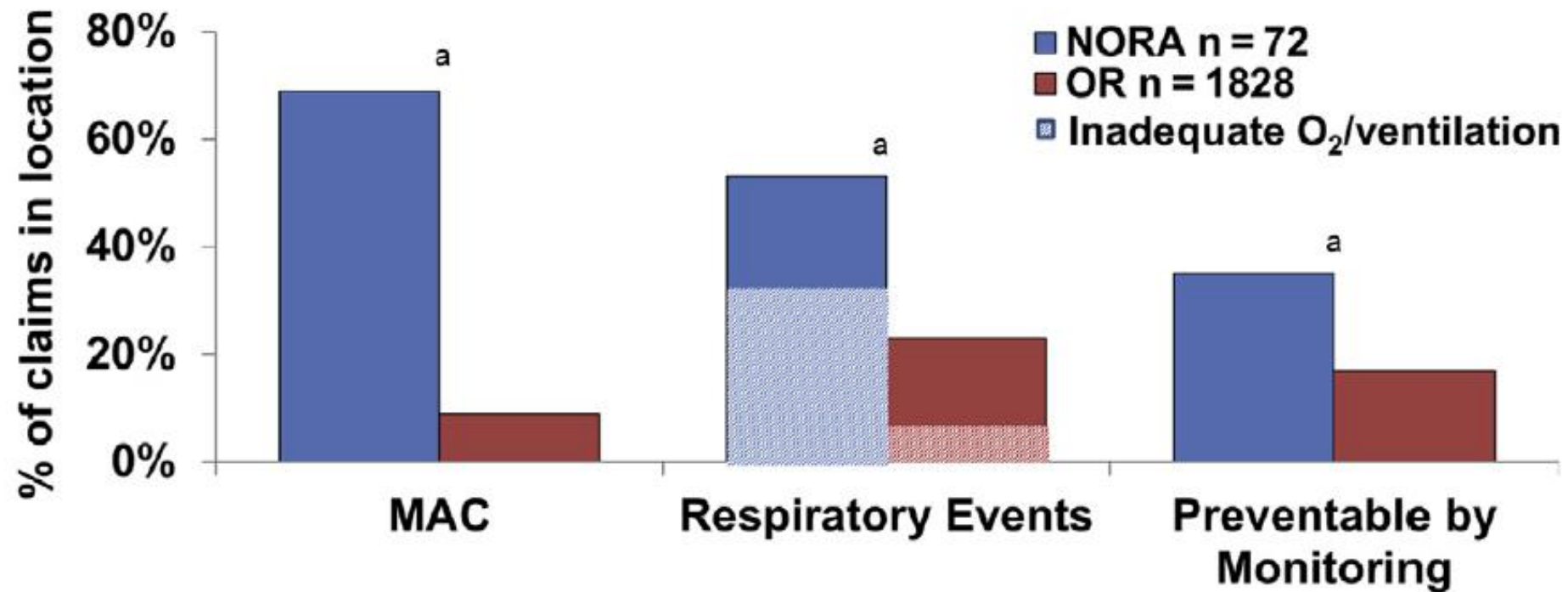
2. Metzner J, Posner KL, Domino KB. The risk and safety of anesthesia at remote locations: the US closed claims analysis. *Curr Opin Anaesthesiol*. 2009;22(4):502-8.

Safety of Non-Operating Room Anesthesia

A Closed Claims Update

Zachary G. Woodward, MD^a,

Richard D. Urman, MD, MBA, FASA^{a,b,*}, Karen B. Domino, MD, MPH^c



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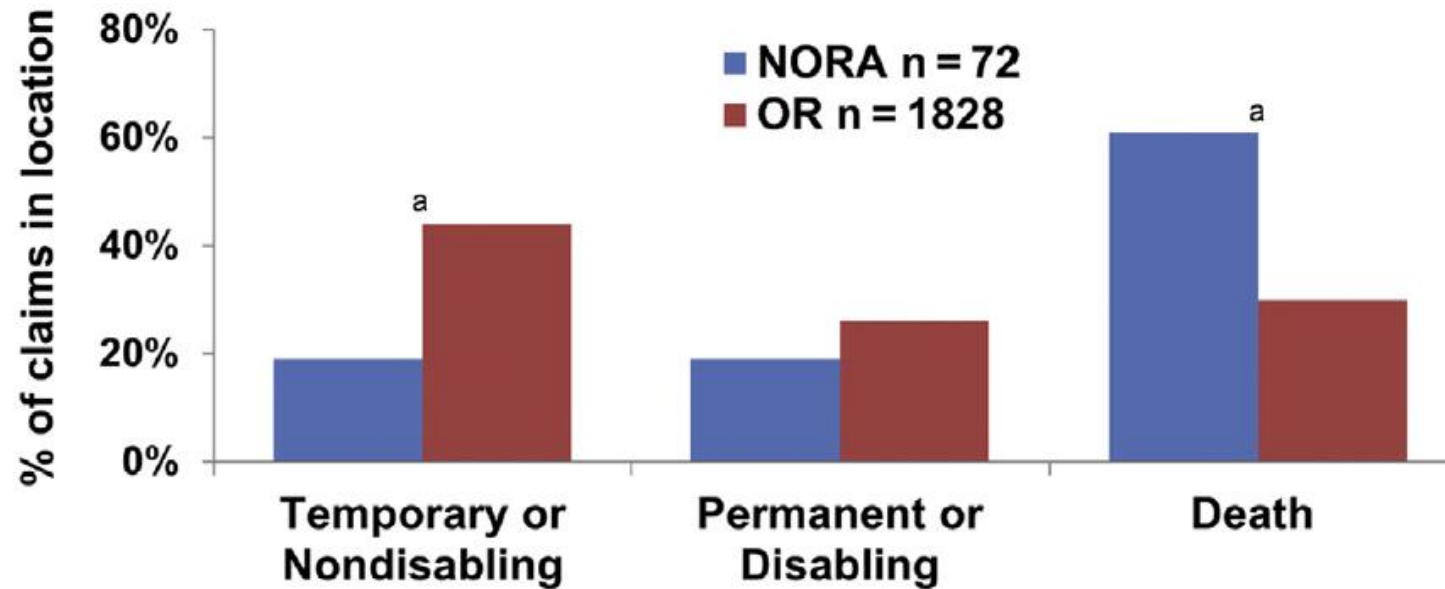
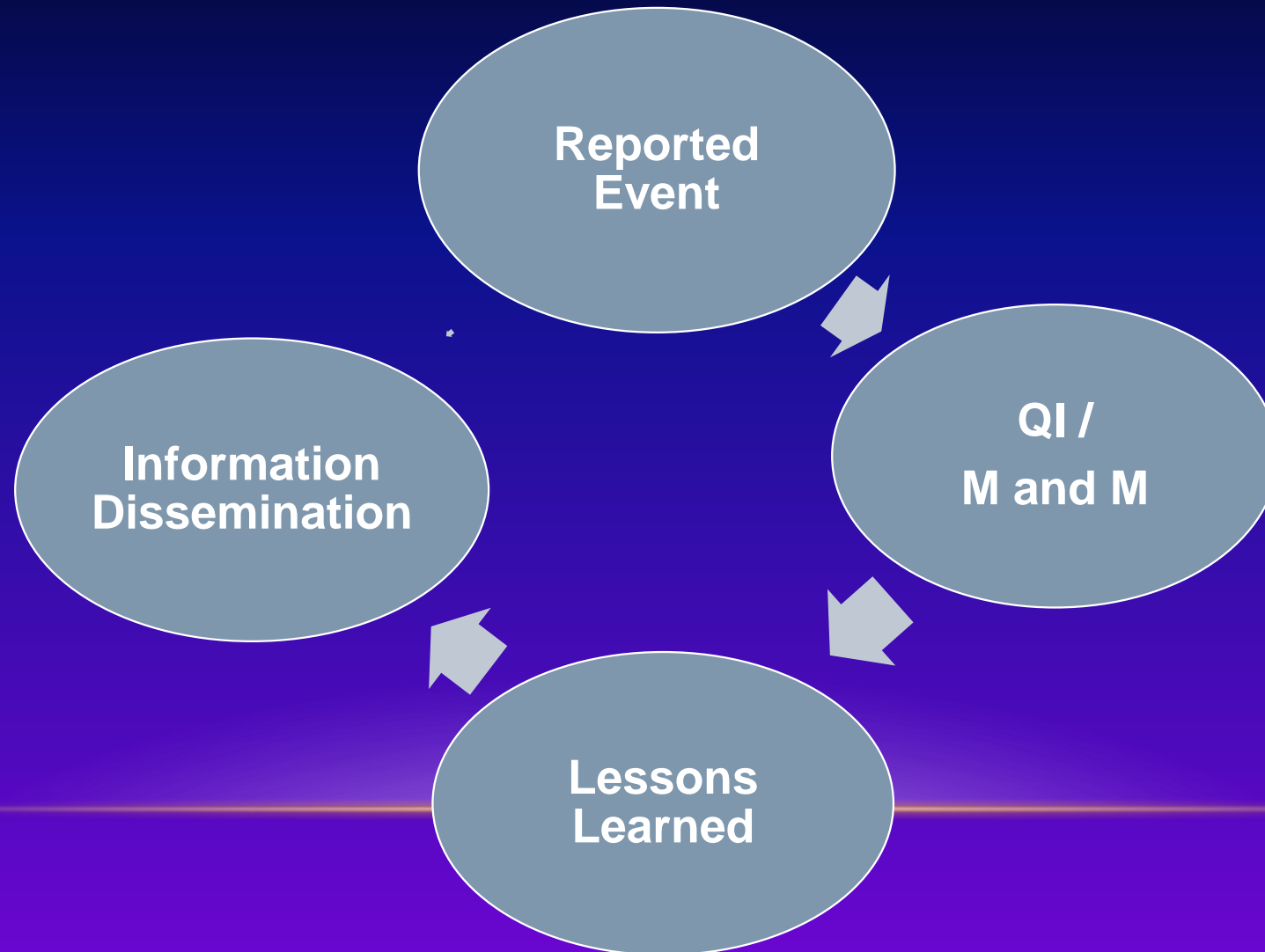


Fig. 1. Severity of injury in non-operating room anesthesia (NORA) claims compared with operating room (OR) claims. ^a $P < .001$.

Registry and QI Process

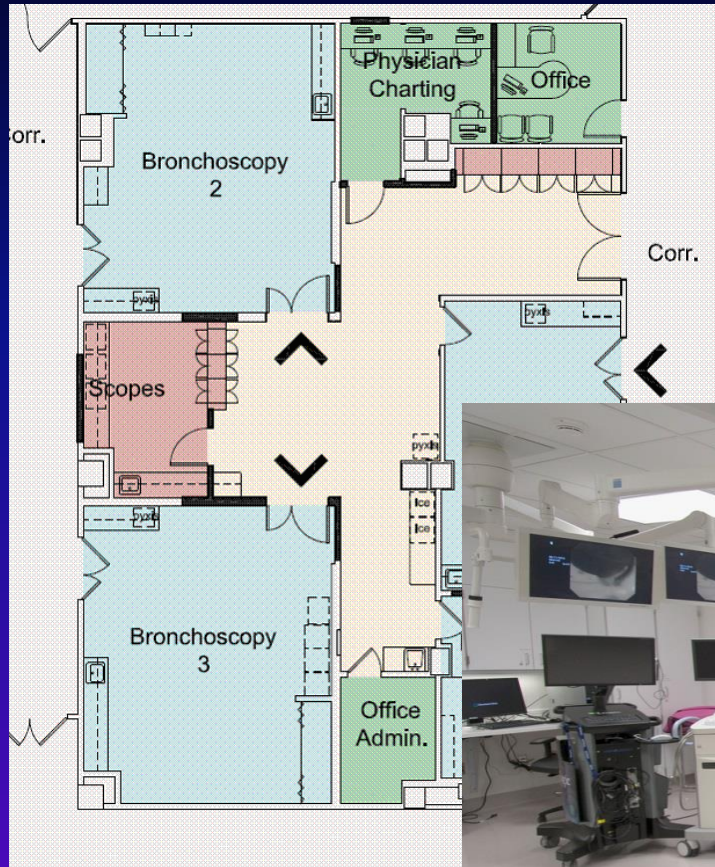


A Blueprint for Success

A Multidisciplinary Approach to Clinical Operations Within a Bronchoscopy Suite

Basem B. Abdelmalak, MD; Thomas R. Gildea, MD, FCCP; D. John Doyle, MD, PhD, DPhil; and Atul C. Mehta, MD, FCCP

Modern Bronchoscopy Suite



Abdelmalak BB, Gildea TR, Doyle DJ, Mehta AC. A Blueprint for Success: A Multidisciplinary Approach to Clinical Operations within a Bronchoscopy Suite. CHEST 2022; 161(4):1112-1121

Modern GI Suite



Modern Interventional Radiology Suite



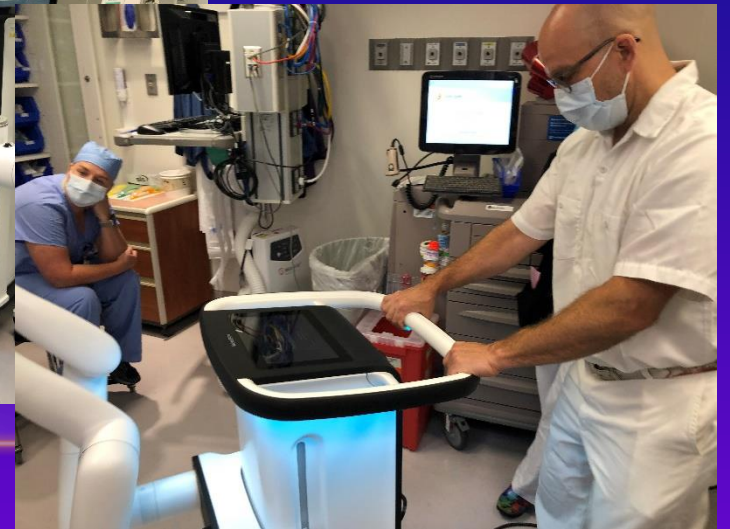
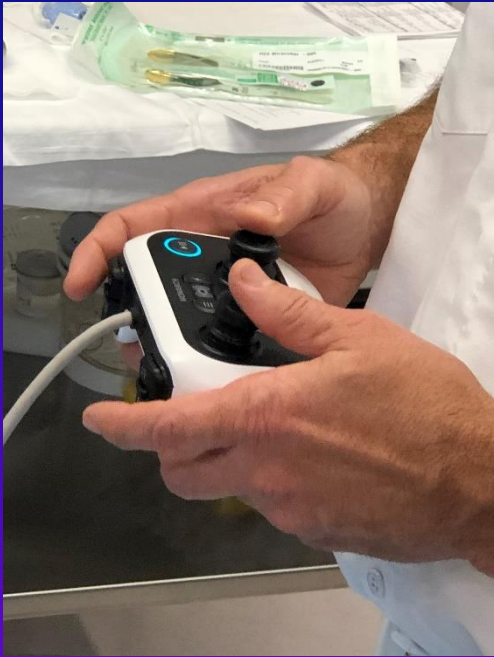
Neurosurgical MRI (IMRIS)



Change and Progress e.g. Robotic Bronchoscopy



Anticipate Emergencies



Safe Execution

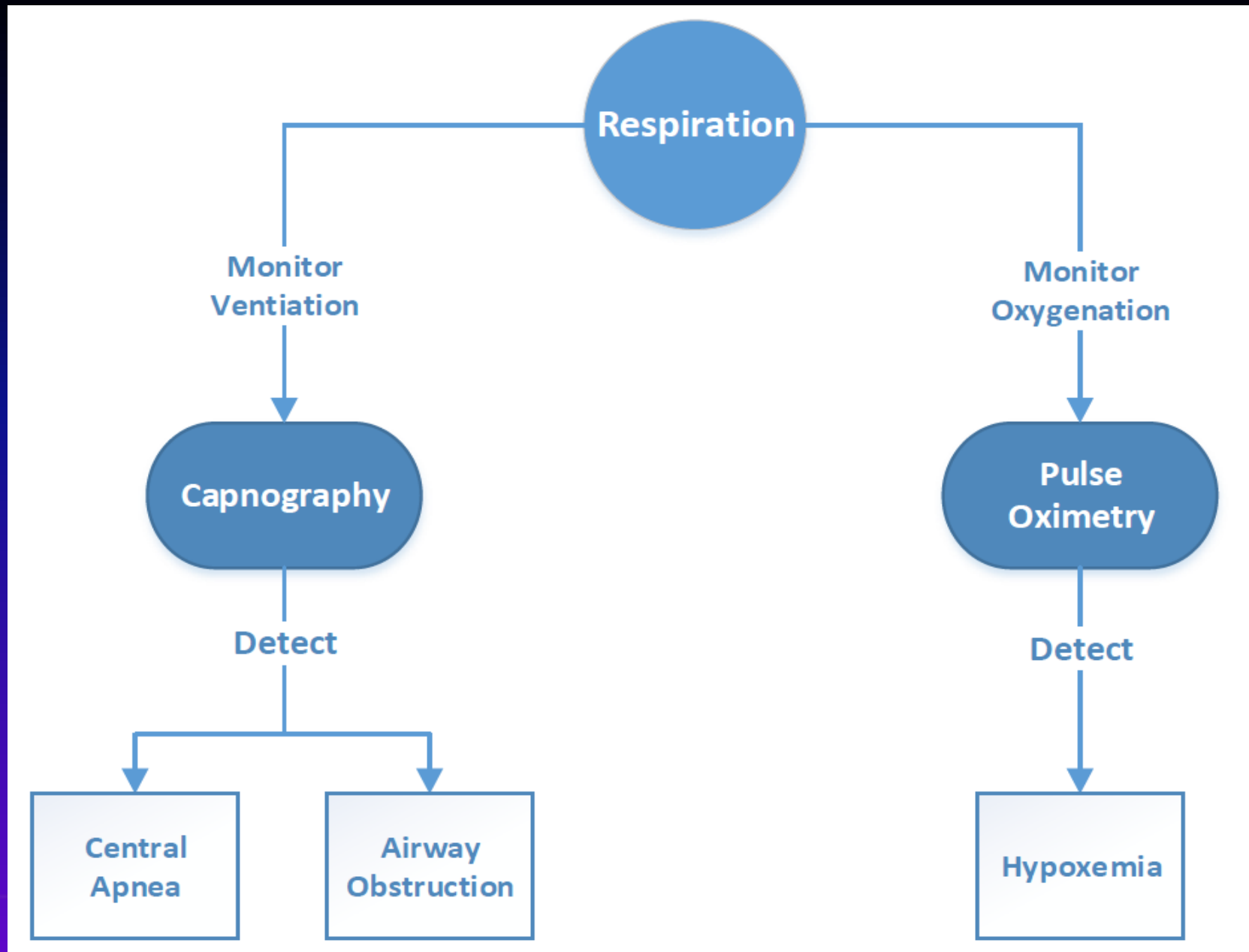


NORA Vs. Procedural Sedation

Interventional Radiology Procedures with Moderate Sedation in the United States

- Risk predictors for respiratory compromise¹ included:
 - long term opioid use
 - substance abuse,
 - age > 65 years
 - sleep apnea
- Cases with respiratory compromise¹ were associated with:
 - higher admission, invasive mechanical ventilation, and ICU cost,
 - longer overall and ICU LoS,
 - more death before discharge

¹ Urman RD, Moucharite M, Flynn C, Nuryyeva E, Ray CE. Impact of Respiratory Compromise in Inpatient. Interventional Radiology Procedures with Moderate Sedation in the United States. Radiology 2019; 00:1–10 3.



NORA Vs. Procedural Sedation

Anesthesia & Analgesia

■ SPECIAL ARTICLE

A Blueprint for Success: Implementation of the Center for Medicare and Medicaid Services Mandated Anesthesiology Oversight for Procedural Sedation in a Large Health System

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Wendy Simmons, MSN, RN,|| Patricia Menendez, MS, BSN, RN, HACP,¶
Elizabeth Haggerty, MLRHR, MBA,# and Christopher A. Troianos, MD, FASE, FASA**

(Anesth Analg 2022;135:198–208)

Summary

- NORA is growing fast, and its future is bright
- Many challenges and complexities
- Successful safe delivery of NORA would require well thought out plan and organization
- There is nothing that we cannot overcome



Cleveland Clinic

Every life deserves world class care.

Thank you for your attention
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