

Perioperative Cognitive Aids: Show me the Evidence

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Objectives

At the end of this presentation, the participant will be able to:

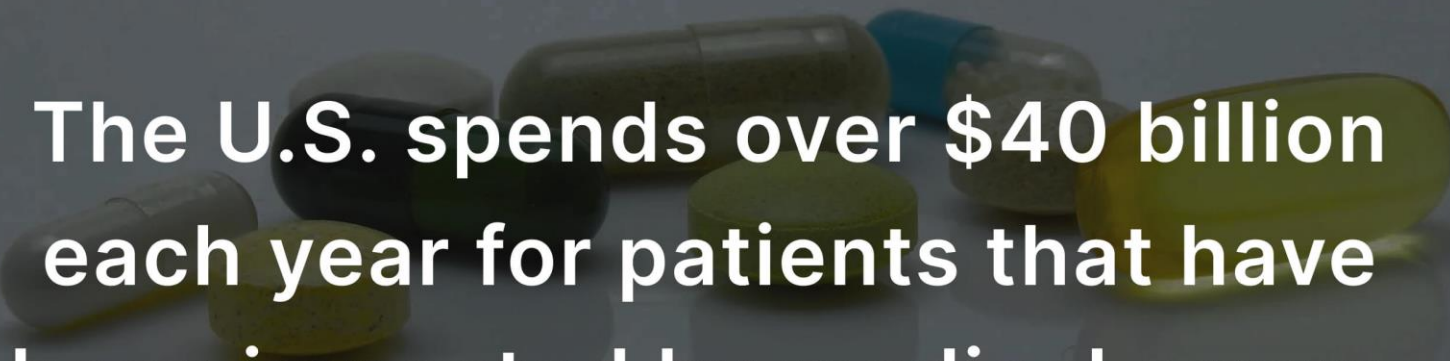
- 1. Define cognitive aids**
- 2. Articulate the outcome evidence supporting the use of cognitive aids.**
- 3. Identify the resources available for implementation**

Introduction

Medical errors and perioperative team dynamics have long been recognized as major determinants of outcomes of resuscitation for anesthesia emergencies. Perioperative clinicians are comfortable in their complacency and have been somewhat resistant to employ the use of cognitive aids.

Gaba, 2013





The U.S. spends over \$40 billion
each year for patients that have
been impacted by medical errors.



Medication error statistics & facts, 2022



**250,000
DEATHS**

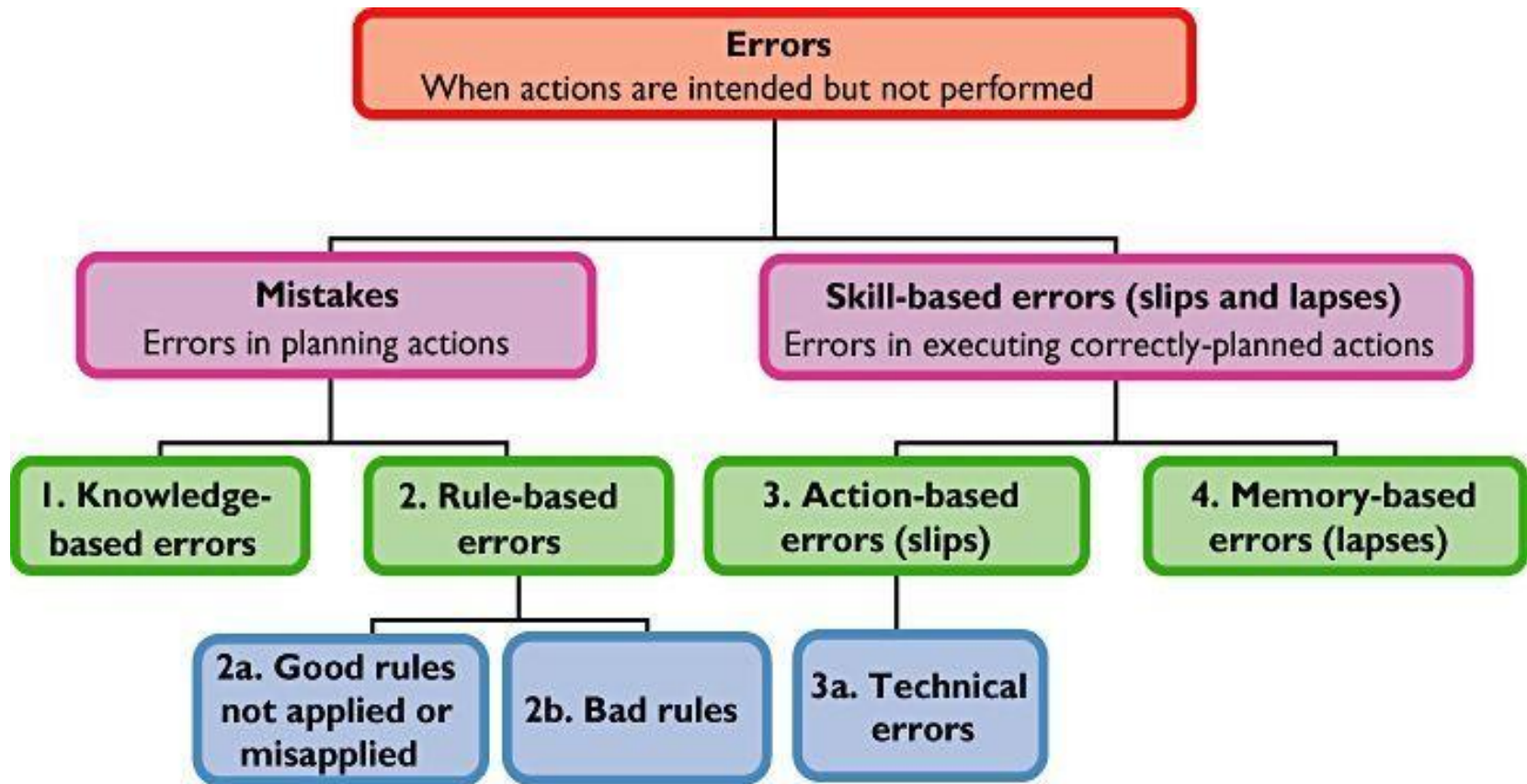
annually

1. heart disease

2. cancer

3. medical errors

Source: bmj.com/content/353/bmj.i2139



Medicine safety

Are hospitals getting any safer?

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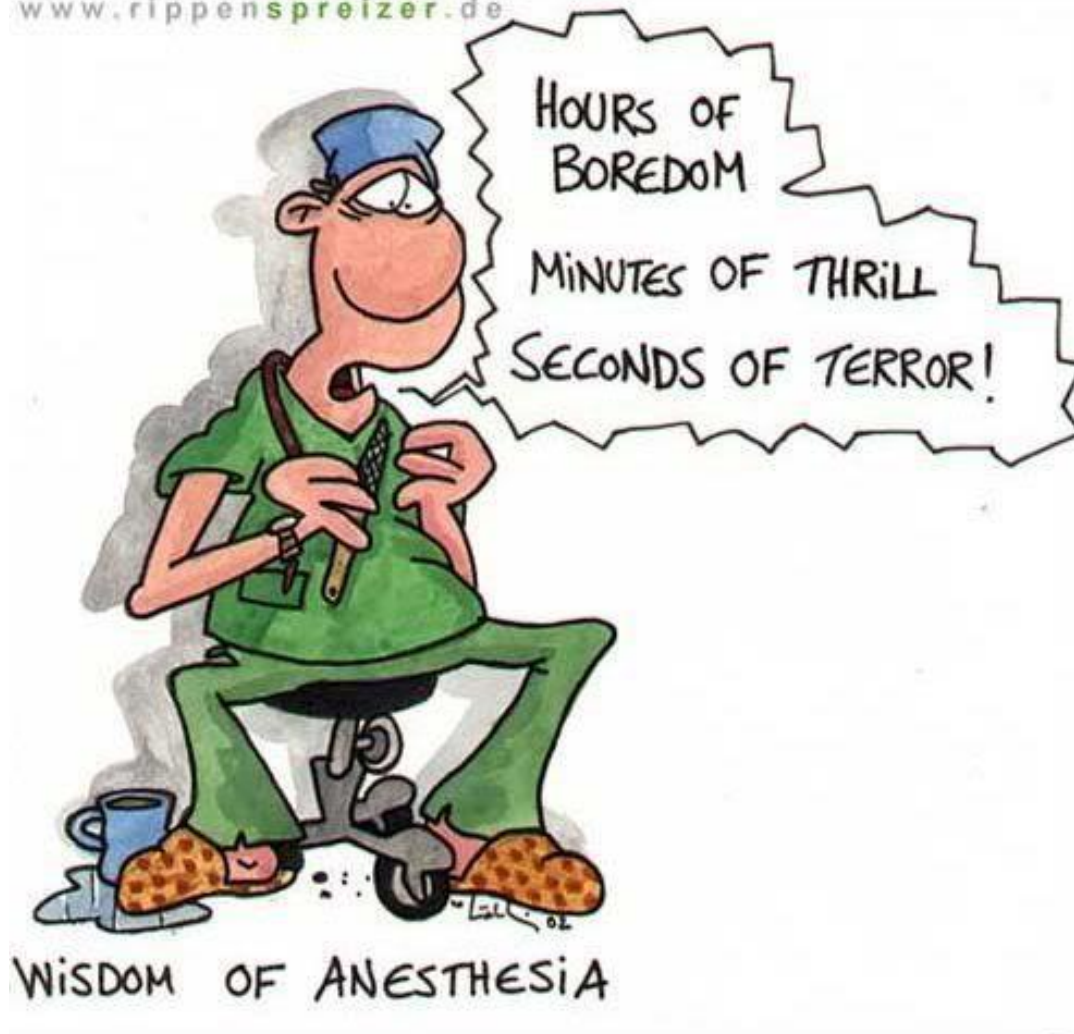
Historical Facts

- Higher error rates usually occur in stressful, fast-paced environments such as emergency departments, intensive care units, and operating rooms.
- Inconsistent postoperative monitoring procedures may lead to errors.
- Inconsistent intraoperative monitoring procedures may lead to errors.
- Multiple practitioners involved → an incomplete assessment
- Lack of understanding of the case or provider capabilities
- Unreliable systems or protocols
- Verbal communication



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The anesthesia consultant com



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Deer in the headlights group. What's going on?



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Cognitive Aids

Prompts designed to help users complete a task or series of tasks ensuring adherence to best practices while completing all critical tasks during evaluation and management of emergencies occurring in the operating room.

Steigler, 2023



Ensure Compliance with Best Practices

- Cognitive performance & memory are limited in highly stressful times.
- Improves timely and thorough performance of correct actions in high industries, i.e. aviation



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Potential to Reduce Human Error

- Reduce decision making errors
- Overconfidence increases vulnerability to errors
- Distorted memory in are emergencies



Compensate for Physical Fatigue

Complex physiologic phenomenon effects

- Cognitive
- Psychomotor
- Emotional state

Physical (sleep related)

- Transient- acute-sleep restriction over short period/days
- Cumulative- mild deprivation- awake extended hours
- Circadian- reduced performance 2a-6a

Compensate for Mental Fatigue

Mental Fatigue

- High volume of intense mental tasks
 - Attention
 - Working memory
 - Precise control of actions



Improve Team Performance

- More appropriate responses
- Less delay for implementation of life-saving measures
- Better teamwork
- Calmer atmosphere
- Catching errors of omissions



Cognitive Aids Development

This Emergency Manual version has been updated.

For the latest version of the Stanford Emergency Manual,
please visit our website:

<https://emergencymanual.stanford.edu>



Dr. Sara Goldhaber-Fiebert

ACLS (for perioperative setting)

Asystole	1
Bradycardia – Unstable	2
PEA	3
SVT Unstable – Tachycardia	4
SVT Stable – Tachycardia	5
VF/VT	6

BROAD DIFFERENTIAL DIAGNOSES

Hypotension	15
Hypoxemia	16

SPECIFIC CRITICAL EVENTS

Amniotic Fluid Embolism	7
Anaphylaxis	8
Bronchospasm	9
Delayed Emergence	10
Difficult Airway – Unanticipated	11

Fire – Airway	12
Fire – Patient	13
Hemorrhage – MTG	14
Hypotension	15
Hypoxemia	16
Local Anesthetic Toxicity	17
Malignant Hyperthermia	18
Myocardial Ischemia	19
Oxygen Failure	20
Pneumothorax	21
Power Failure	22
SVT Stable – Tachycardia	5
Total Spinal Anesthesia	23
Transfusion Reaction	24
Venous Air Embolus	25

CRISIS RESOURCE MANAGEMENT 26

EMERGENCY MANUAL

SURGICAL SAFETY CHECKLIST

Before Induction of Anesthesia →

Before Skin Incision/Procedure →

Before Patient Leaves Room
(COMPLETED IN OR/PROCEDURE ROOM)

O.R. BOARDING CHECKLIST

OR CIRCULATING NURSE DOCUMENTS VERIFICATION OF THE FOLLOWING:

- ☐ Patient bypass preop?
- Confirmation of the following with the patient:
- ☐ Patient ID
- ☐ Site Marking by Surgeon
- ☐ Consent
- ☐ Current H&P (within 30 days / within 24 hrs prior to scheduled procedure)
- ☐ Allergy band on
- ☐ Latex allergy
- ☐ ABO blood group verified
- ☐ UNOS ID# (if applicable)
- ☐ Equipment/Instrument Issues or any concerns

NEW ANESTHESIOLOGIST & CIRCULATOR VERIFY: (confirmed by the Anesthesiologist)

- ☐ Anesthesia Safety Check completed
- ☐ Pulse Oximeter on Patient and Functioning
- ☐ Difficult Airway/Aspiration risk?
- ☐ Risk of >500ML Blood Loss (7ML/KG in children)

TIME OUT

OPERATIVE TEAM MEMBER INTRODUCTION BY NAME & ROLE

VERBALIZED OUT LOUD

FOR ALL TEAM MEMBERS TO VERIFY

STOP!

SURGICAL TEAM CONFIRMS:

- ☐ Correct patient and procedure
- ☐ Correct position
- ☐ Correct operative site/side
- ☐ Consent is complete, accurate, and signed
- ☐ Surgical site marked by surgeon
- ☐ Mark visible after prep / after drape
- ☐ Images/implants available (if needed)
- ☐ Prophylactic antibiotic given / time
- ☐ DVT Prophylaxis

NEW

NURSING VERIFIES:

- ☐ Implementation of aseptic technique

SURGEON VERIFIES:

- ☐ Any critical or unexpected steps
- ☐ Procedure duration
- ☐ Anticipated blood loss
- ☐ Any patient-specific concerns

POST EVALUATION/TEAM DEBRIEF

VERBALIZED OUT LOUD
FOR ALL TEAM MEMBERS TO
VERIFY

CIRCULATOR/SCRUB VERIFIES:

- ☐ Discharge to
- ☐ Notification to
- ☐ Post-op airway status
- ☐ Level of consciousness
- ☐ Allergy band on
- ☐ ID band on
- ☐ Implant sheet complete
- ☐ Video/photo to:

NEW

ALL TEAM MEMBERS DISCUSS:

- ☐ Name of procedure and wound class recorded
- ☐ Counts are correct (or NA)
- ☐ Read back specimen labeling & Path form filled out per protocol
- ☐ Equipment/Instrument problems to address
- ☐ Key concerns for recovery and management of patient

The Wrong way to do a Time Out



Pinterfest.com

AMNIOTIC FLUID EMBOLISM

By Stanford Anesthesia Cognitive Aid Group

SIGNS

Consider amniotic fluid embolism if there is the sudden onset of the following in a pregnant or post-partum patient:

1. Respiratory distress, decreased O₂ saturation
2. Cardiovascular collapse: hypotension, tachycardia, arrhythmias, cardiac arrest
3. Coagulopathy +/- Disseminated intravascular coagulation (DIC)
4. Seizures
5. Altered mental status
6. Unexplained fetal compromise

CALL FOR HELP



CODE CART

INFORM TEAM

TREATMENT

1. Anticipate possible **cardiopulmonary arrest** and **emergent C-section**
2. Place patient in left uterine displacement (LUD)
3. Increase to **100% O₂**, high flow
4. Establish large volume **IV access** (upper body best)
5. Support circulation with **IV fluid, vasopressors, and inotropes**
6. **Prepare for emergent intubation**
7. When possible, place arterial line. Consider central venous access or IO line in humerus
8. Anticipate **massive hemorrhage** and DIC. **Go to Hemorrhage - MTG event**
9. Consider **circulatory support**: IABP/ECMO/CPB

RULE OUT

Rule out other causes that might present in a similar fashion:

- | | |
|-----------------------|---|
| 1. Eclampsia | 7. Anesthetic overdose |
| 2. Hemorrhage | 8. Sepsis |
| 3. Air embolism | 9. Cardiomyopathy/cardiac valvular abnormality/MI |
| 4. Aspiration | 10. Local anesthetic toxicity |
| 5. Anaphylaxis | |
| 6. Pulmonary embolism | |



7 AFE

EMERGENCY MANUAL V2.4 November 2014

Difficult Airway / Cric

Failed laryngoscopy or difficulty oxygenating or ventilating

TREATMENT

Task	Actions
Crisis Resources	<ul style="list-style-type: none"> Inform team Call for airway help Call for anesthesia tech Call for difficult airway cart
Optimize Conditions	<ul style="list-style-type: none"> Ensure paralysis (e.g. rocuronium 1.2 mg/kg) Ensure anesthetic depth (e.g. re-bolus or infuse propofol) Optimize positioning (e.g. sniffing position, head of bed elevation to 30°, neck extension, bed height)
Oxygenate	<ul style="list-style-type: none"> Do not fixate on intubation Monitor CO₂ return by capnography and SpO₂ If SpO₂ critically low at any time: go to red box below Consider oxygenation modalities (max 2 attempts each): <ul style="list-style-type: none"> Mask: use two-handed grip; insert oronasal airway Supraglottic airway SGA/LMA: optimize size and fit (change position of head or device, cuff inflation); consider 2nd generation Laryngoscopy: video preferred. Consider alternate blade, rigid stylet, bougie, external laryngeal manipulation, release of cricoid pressure Choose experienced operator and familiar equipment

Can Oxygenate:

- Monitor CO₂ return by capnography and SpO₂
- If cannot oxygenate at any time: go to red box**
- While oxygenating, options include:
 - Awaken patient
 - Finish case with SGA/LMA or mask
 - Intubate through SGA/LMA
 - Combined video/fiberoptic
 - Other advanced airway techniques

Cannot Intubate, Cannot Oxygenate (CICO):

- Priority is cutting the neck!**
- Call for Cric-capable help
- Get Cric kit: scalpel (e.g. #10 blade), bougie, and 6.0 ET tube
- Additional operator can attempt to oxygenate from above (e.g. mask, SGA/LMA, video laryngoscopy)
- Start Cric/Inf OMA (next page)**

Page 2 Difficult Airway / Cric

OBSC / EMERGENCY FRONT OF NECK ACCESS (FONA)

Inform Team	Announce emergency cric / front of neck access
Call for Help	ENT, Gen Surgery, ICU, Anesthesiology, Code Team
Prep	<ul style="list-style-type: none"> Expose and extend neck Obtain scalpel, bougie, and lubricated 6.0 ET tube
Meds	Give paralytic and anesthetic
Oxygenate and Monitor	<ul style="list-style-type: none"> Additional operator can attempt to oxygenate from above (e.g. mask, SGA/LMA, video laryngoscopy) Monitor vital signs and pulse



If risks for difficult airway, make contingency plans and consider:

- Advanced airway equipment in room (e.g. difficult airway cart, second generation SGA/LMA, intubating SGA/LMA, intubation catheter, fiberoptic bronchoscope, rigid bronchoscope, scalpel/bougie cric kit)
- Awake intubation
- High flow apneic oxygenation
- Video laryngoscopy as first attempt
- ENT or General Surgery in room
- Awake tracheostomy (in consultation with surgeon)
- ECMO pre-cannulation with perfusionist in room

END

Crisis Resource Management

Call for help early

- Call for help early enough to make a difference
- Err on the side of getting more help
- Mobilize early personnel with special skills if they may be needed

Designate leadership

- Establish clear leadership
- Inform team members who is in charge
- "Followers" should be active in asking who is leading

Anticipate and plan

- Plan and prepare for high work-load periods during low work-load periods
- Know where you are likely headed during the crisis and make backup plans early

Establish role clarity

- Determine who will do what
- Assign areas of responsibility appropriate to knowledge, skills, and training
- Active followers may offer specific roles

Know the environment

- Maintain situational awareness
- Know how things work and where things are
- Be aware of strengths and vulnerabilities of environment

Use all available information

- Monitor multiple streams of data and information
- Check and cross check information

Distribute the workload

- Assign specific tasks to team members according to their abilities
- Revise the distribution if there is task overload or failure

Allocate attention wisely

- Eliminate or reduce distractions
- Monitor for task saturation and data overload
- Avoid getting fixated
- Recruit others to help with monitoring

Communicate effectively

- Command and request clearly
- Seek confirmation of request (close the loop)
- Avoid "thin air" statements
- Foster input and atmosphere of open information exchange among all personnel

Mobilize resources

- Activate all helpful resources including equipment and additional personnel

Use cognitive aids

- Be familiar with content, format, and location
- Support the effective use of cognitive aids

Fire - Airway

Sudden pop, spark, flame, smoke, heat, or odor

TREAT MINUT

Task	Actions
Crisis Resources	<ul style="list-style-type: none"> - Inform team - Identify leader - Call for help
Anesthesia Professional Immediate Response	<ul style="list-style-type: none"> - Disconnect breathing circuit from the anesthesia machine to prevent torch formation - Stop fresh gas flow
Surgeon Immediate Response	<ul style="list-style-type: none"> - If clamp immediately available: clamp ET tube. If clamp not available: fold (kink) ET tube (prevents torch formation if circuit not yet disconnected) - Immediately remove ET tube and any airway foreign bodies - Pour saline into airway and suction debris
Check Extent of Fire	<ul style="list-style-type: none"> - If fire spreads beyond airway (e.g. to drapes, patient): See Fire - Non-Airway #11
After Fire Extinguished	<ul style="list-style-type: none"> - Re-establish oxygenation when fire is extinguished - Minimize FiO_2 as much as possible. Consider air ventilation - Consider prompt reintubation with ET tube ≥ 7.0 mm ID prior to swelling - Ensure adequate anesthesia: e.g. propofol infusion - Perform bronchoscopic examination of entire airway to assess injury and remove residual debris - Inspect ET tube pieces to verify none left in airway - Save all materials for later investigation - Consider steroid: e.g. dexamethasone 8 mg IV
Disposition	<ul style="list-style-type: none"> - ICU care for prolonged mechanical ventilation and airway observation

Page 2 Fire - Airway

PREVENTION

Fire Risk = Fuel Source + Oxidizer + Ignition Source

For All High Risk Procedures

- Discuss fire prevention and response during time out
- Avoid $\text{FiO}_2 > 0.3$ and avoid N_2O
- Anesthesia provider: communicate FiO_2 changes
- Surgeon: communicate use of laser or electrocautery

For Laser Surgery of Vocal Cord or Larynx

- Use laser resistant ET tube (single or double cuff)
- Ensure ET tube cuff is sufficiently below vocal cords
- Consider filling proximal ET tube cuff with methylene blue-tinted saline
- Surgeon: keep laser in standby when not in use
- Surgeon: protect ET tube cuff with wet gauze
- Surgeon: check $\text{FiO}_2 < 0.3$ and N_2O not in use before lasering or electrocauterizing
- Anesthesia provider: communicate FiO_2 changes

For Non-laser Surgery in Oropharynx

- Regular PVC ET tube may be used
- Surgeon: protect ET tube with wet gauze
- Consider continuous suctioning inside oropharynx
- Surgeon: confirm $\text{FiO}_2 < 0.3$ and no N_2O prior to electrocautery use
- Anesthesia provider: communicate FiO_2 changes

Implementation

- “Buy-in” of clinician end users
- Systematic team training (in situ drills)
- Ongoing opportunities for practice
- Stress relevance, content, and importance for the setting



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During surgical and other interventional procedures, cognitive aids for specific emergencies that may occur in these settings should be immediately and readily available to ensure that best practices are followed and that no critical steps are missed.

EVERY OR SHOULD HAVE A SET!



**THANK
YOU**

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DesiComments.com

Descicomments.com

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