The End of Summer, the Start of Anesthesiology Safety

John W. Blenko, MD
Consultant
Member, Clarity PSO Healthcare Advisory Council
blenkojw@gmail.com

Formerly: Associate Professor, Department of Anesthesiology, University of Maryland School of Medicine
Attending Anesthesiologist, R Adams Cowley Shock Trauma Center, Baltimore, Maryland

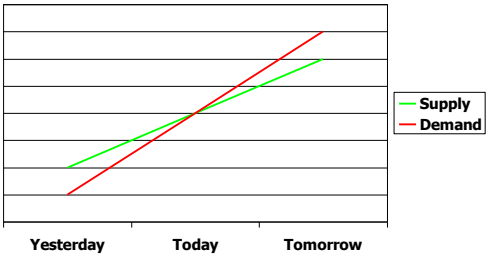
Low-Lying Summer Fruit

- Moderate Sedation
- Emergency Protocols & Manuals
- Patient Handoffs
- Extubation of the Airway

Moderate Sedation

- Moderate Sedation
  - Drug-induced depression of consciousness
  - Purposeful response to verbal commands
  - Airway maintained, spontaneous ventilation adequate
  - Cardiovascular function usually maintained

Anesthesia Providers Supply vs. Demand



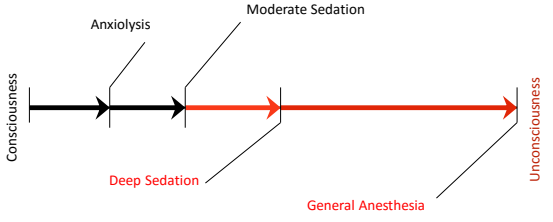
Hospital-Based Survey

- Location
  - 1/3 of all events occurred in the GI lab
- 50% of the patients became symptomatic and needed intervention
  - Over half of these patients were in the GI lab
- 40% of patients required administration of a reversal agent

The Joint Commission

- Standard LD.04.03.07
  - Patients with comparable needs receive the same standard of care, treatment, and services throughout the hospital
    - Pre-
    - Intra-
    - Post-procedure
- End-tidal CO2 (EtCO2) monitoring
  - 2010 ASA Guidelines mandate for moderate/deep sedation
  - CMS does not mandate
    - But …

The Sedation Continuum



Moderate Sedation … Really?

- Moderate Sedation
  - Drug-induced depression of consciousness
  - Purposeful response to verbal commands
  - Airway maintained, spontaneous ventilation adequate
  - Cardiovascular function usually maintained
- Deep Sedation
  - Drug-induced depression of consciousness, not easily aroused
  - Ventilation and airway maintenance may be impaired
  - Cardiovascular function usually maintained

Staff Competency

- Are staff required to:
  - Perform some number X of cases under supervision before being granted privileges?
  - Demonstrate basic airway skills as a requirement for credentialing?
    - B-V-M, oral airway, suctioning
  - Demonstrate continual mastery of competence in sedation and basic airway management for recredentialing?

Reversal Agents

- Possibly a surrogate marker for oversedation
- Easy to monitor via CPMOE and pharmacy records

Quality Assurance Process Indicators

- X cases per quarter or X% of all cases
  - Consent for both procedure and sedation
  - Completed history, physical exam, airway exam
  - Review of H&P and airway exam by LIP immediately prior to procedure if done by someone else
  - NPO status
  - Required participants available
    - Credentialed for procedure
    - Credentialed for sedation
  - Required monitoring performed
  - Required documentation performed
  - Patient discharged in the care of a responsible adult

Quality Assurance Outcomes

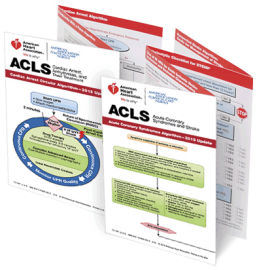
- 100% review of all:
  - Respiratory events requiring positive pressure ventilation
  - Circulatory events requiring pressors and/or volume infusions
  - Cases where monitoring indicates deep sedation occurred
  - Unplanned admission after outpatient procedure
  - Deaths
  - Aspirations

Thoughts to Ponder

- Do you have the same standard of care throughout the facility vis-à-vis moderate sedation?
- Is deep sedation being practiced under the guise of moderate sedation?
- Are staff required to demonstrate competency and resuscitative techniques as a part of credentialing/recredentialing?
- Is the use of reversal drugs monitored?
- Are sedation procedures reviewed to monitor performance?

Emergency Protocols & Manuals

Does Adherence Really Matter?



- Adherence to ACLS protocols increases ROSC
  - Percentage of correct steps performed correlated with ROSC
  - Number of errors of commission and omission were both negatively correlated with ROSC

McEvoy et. al. Resuscitation 2013; 85:82-87

Memory vs. Metal

- McEvoy (2014)
  - Simulated cardiac arrest, 47 medical students
  - Two scenarios, memory vs. decision support tool (DST)
  - Results
    - Correct management steps 84.7% (DST) vs. 73.8%
    - Errors of commission 2.5 (DST) vs. 3.8
    - Time to first defibrillation was similar
- Low (2011)
  - Simulated cardiac arrest, 31 physicians
  - iResus app for iPhone
  - CASTest 84.5% (iResus) vs. 72%

McEvoy et. al. Resuscitation 2014; 85:138-142; Low et. al. Anaesthesia 2011; 66:255-262

Simulation Studies

- Marshall (2013)
  - 10 studies found cognitive aid helpful, 3 did not
  - Results on team performance mixed
  - The design of the cognitive aid needs to be considered

Marshall S. Anesth Analg 2013; 117:1162-1171

The Role of a "Reader"

- Burden (2012)
  - Anes/OB residents, 31 simulations: obstetric CA, MH
  - No subjects performed all the critical steps before the introduction of a "reader"
  - Reader "stepped in" if the subject was not managing the crisis
  - During debrief, subjects acknowledged benefit of reader
- McEvoy (2014)
  - Anesthesia residents, 31 simulations, LA toxicity
  - Reader + DST vs. memory
  - Critical management steps 94% (reader/DST) vs. 0% (memory)

Burden et. al. Sim Healthcare 2012; 7:1-9; McEvoy et. al. Reg Anesth Pain Med 2014; 39:299-305

Who Should Be the "Reader"?

- McEvoy (2014)
  - "We have found that a member of the anesthesia/ perioperative care team, such as a anesthesia technician or perioperative nurse, is the most appropriate person to serve as the Reader"

Whomever the reader is, and whatever format the memory aid is, the emergencies should be practiced as full team simulations.

McEvoy et. al. Reg Anesth Pain Med 2014; 39:299-305

Take Home Messages

- Rare events happen … well ... rarely
- Humans are fallible
- Checklists can cement understanding of an issue, especially if created by multispecialty teams
- Checklists are easy to use

Thoughts to Ponder

- Have you incorporated emergency manuals and protocols into your procedure areas?
- Have all the stake holders been involved?
- Do you use a reader? Who is it?
- Have you practiced complete drills?

Patient Handoffs

What Is a Handoff?

- A transition in patient care
  - Provider to provider (shift change, break)
  - Phase of care to phase of care (OR➔PACU; OR➔ICU)
- A transfer of responsibility
- A back and forth, active interchange between the parties involved
- An important safety issue
  - *The vast majority of adverse events are attributed to communication failure!*
- Poorly studied

Is There a Problem?

- Prospective study (attendings, residents, CRNAs)
  - 50.9% Handover protocol in place
    - Only 11.2% said included necessary elements
  - 85% of respondents said *they* had received a poor handoff
  - Items rarely mentioned:
    - Medications
    - Postoperative plan
    - Code status
    - Refusal of blood
    - Type & screen antibodies

Choromanski D et. al. J Biomed Res 2014; 28:383-387

Causes

- Patient acuity
- Patient turnover
- Number of comorbidities
- Production pressure
- The impact of resident duty hours
- Few US medical schools teach didactic sessions on handoffs

Choromanski D et. al. J Biomed Res 2014: 28:383-387; Dracup K and Morris P. Am J Crit Care 2008; 17: 95-97

What We Do Know?

- Handoffs are poorly studied
- EMRs may – in fact – have led to a decrease in handoff quality
  - The interactive, human component is critical
  - Active listening, active questioning
- A standardized presentation leads to less "missed" material
  - Improved "receiver" satisfaction

Can We Make Handovers Safer?

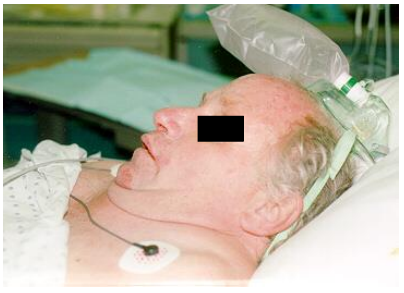
- Standardize the process (checklist, protocol)
- Make sure the patient is stable before starting the handover
- "Sterile cockpit"
- Presence of entire team
- Training in team skills and communication

Segall et. al. Anesth Analg 2012; 115:102-115

Thoughts to Ponder

- Do you have standardized patient handoffs?
  - PACU
  - ICU
- Do you use team training in your institution?

Extubation of the Airway



Extubation of the Airway

Case Study

A 58 year old male, 120 kg, PMH of HTN, DM II, HLD, and CAD s/p stents, presents for initial debridement of Fournier's gangrene. Intubation was performed with a video laryngoscope and demonstrated a grade 2b view of the vocal cords. Surgery took 4 hours during which time the patient received 3 units PRBC, 4 units FFP, one platelet 6 pack, and 3 liters of crystalloid. A norepinephrine (Levophed®) drip was started intraoperatively. Patient temperature was 35.6° C. At the end of the procedure, the patient responded to verbal commands to open his eyes and SpO_2 was 100%. After extubation, the patient was taken to the PACU with a non-rebreather face mask in place.

Extubation of the Airway

Case Study

Upon arrival in the PACU, the SpO_2 was 89% and the patient was apneic. Mask ventilation was difficult and intubation was attempted several times but was unable to be completed successfully. The patient became bradycardic. *"Any available surgeon"* was STAT paged to the PACU to perform a surgical airway.

The patient expired.

ASA Closed Claims Studies

- Adverse respiratory events in anesthesia (1990)
  - Airway events were 34% of all adverse events
  - Death or brain damage occurred in 85%
- Management of the difficult airway (2005)
  - Event location
    - 87% perioperative
    - 13% outside operating room area
  - Outcome

• Perioperative area	46% death	12% brain damage
• Outside the OR	87% death	13% brain damage

Caplan RA et. al. Anesthesiology 1990; 72:828-833; Peterson GN et. al. Anesthesiology 2005; 103:33-39

Extubation

- Less studied and less information available
- A difficult airway remains a difficult airway
- May be more dangerous than intubation

Checklists

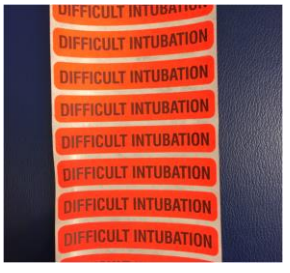
- Humans are prone to errors
- Role of checklists
  - Aviation, nuclear power plants
  - Outcomes
- Checklists in medicine
  - Decreased M&M, use of resources
  - Pronovost et. al., NEJM 2006; 355:2725-2732

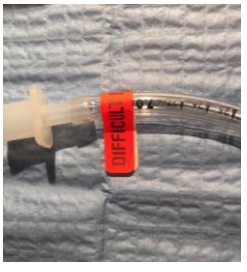
Extubation Checklist

- Use an extubation checklist
  - In addition to meeting normal physiologic criteria for extubation, the following eight questions are answered:
    - Awake, follows commands, agitated, cooperative, train-of-four, muscle relaxant reversed, temperature WNL, ETT leak test
- Results
  - Extubation failures decreased by 52%

Howie WO and Dutton RP. AANA 2012; 80:179-184

Airway Identifiers

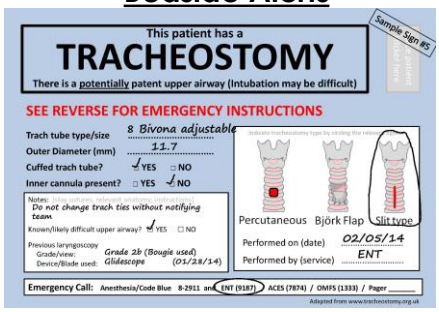




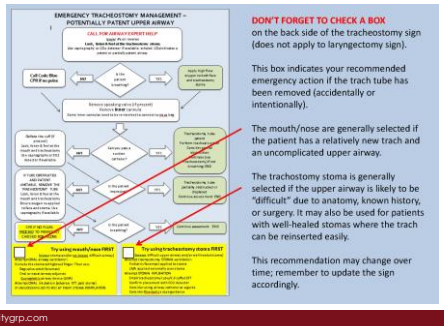
Courtesy of University of Virginia Medical Center, Geraldine Syverud, CRNA

Patient Identifiers

Bedside Alerts



Bedside Alerts



DON'T FORGET TO CHECK A BOX
on the back side of the tracheostomy sign (does not apply to laryngectomy sign).

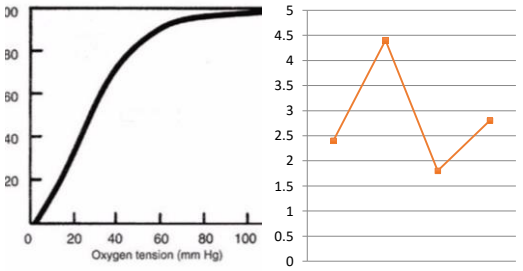
This box indicates your recommended emergency action if the trach tube has been removed (accidentally or intentionally).

The mouth/nose are generally selected if the patient has a relatively new trach and an uncomplicated upper airway.

The trachostomy stoma is generally selected if the upper airway is likely to be "difficult" due to anatomy, known history, or surgery. It may also be used for patients with well-healed stomas where the trach can be reinserted easily.

This recommendation may change over time; remember to update the sign accordingly.

Staff Education



Thoughts to Ponder

- Have you incorporated protocols/reminders in your EMR or AIMS?
- How are "outside the OR" staff alerted to a difficult airway?
- Education for "outside the OR" staff

Questions & Discussion

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blenkojw@gmail.com

Thank You!

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