University of California Irvine
Medical Education Simulation Center
Curriculum

Obstructive Mucus Plug in the Prone Position

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Curriculum Outline

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Section 1: Demographics

Case Title: Obstructive Mucus Plug in Prone Position

Case Description & Diagnosis: A 42-year-old male smoker undergoing a T7-T8 laminectomy and fusion in the prone position suddenly develops complete airway obstruction shortly after dissection has begun.

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Target Audience(s):

- Anesthesiology residents (PGY 2-PGY4)
- Anesthesiologists in practice
- Certified Registered Nurse Anesthetists (CRNA)

Section 2: Curricular Information

Educational Rationale: This case provides an opportunity to discuss the risks associated with prone positioning, management of a patient who is a heavy smoker, as well as crisis resource management (CRM) in the setting of acute airway obstruction. This case highlights a commonly encountered phenomenon occurring in a field avoidance scenario and requires prompt diagnosis and timely management of loss of end tidal carbon dioxide ($ETCO_2$) and ventilation. Although mucus plugging is not an uncommon problem, there are very few published reports detailing the challenges.[6], this scenario allows the learner to practice low-medium occurrence, high risk event in the safe simulation setting, followed by an introspective debriefing. This case will highlight the following principles of CRM[3]: Effective communication with the health care team, calling for help early enough to make a difference and utilizing all available resources. This case reinforces the lessons taught in CRM[4].

Prerequisite Knowledge and Skills:

Required Knowledge Background

- Anatomy related to airway
- Drugs used for general anesthesia, rapid sequence induction, reversal, and ACLS
- ASA Difficult Airway Algorithm
- ASA Guidelines for Basic Monitoring

Required Background Skills

- Airway Assessment
- Emergency Airway Management
    - Bag Mask Ventilation
    - Proper use of oral and nasal airway
    - Performing laryngoscopy
    - Perform suctioning
- Advanced Cardiac Life Support Protocols

ACGME Core Competencies – (1) Patient care (PC), (2) Medical knowledge (MK), (3) Practice-based learning and improvement (PLI), (4) Interpersonal and communication skills (CS), (5) Professionalism (PR), and (6) Systems-based practice (SBP)

ACGME Anesthesiology Milestones

	MILESTONES	"X" included in scenario
PC1	Pre-Anesthesia Patient Evaluation, Assessment, and Preparation	
PC2	Anesthetic Plan and Conduct	X
PC3	Peri-procedural Pain Management	
PC4	Management of Peri-anesthetic Complications	
PC5	Crisis Management	X
PC6	Triage and Management of the Critically-ill Patient in a Non-operative Setting	
PC7	Acute, Chronic, and Cancer-related Pain Consultation and Management	
PC8	Technical Skills: Airway Management	X
PC9	Technically Skills: Use and Interpretation of Monitoring and Equipment	X
PC 10	Technical Skills: Regional Anesthesia	
MK1	Knowledge of Biomedical, Clinical, Epidemiological, and Social-behavioral Sciences as Outlined in the ABA Content Outline	
SBP1	Coordination of Patient Care within the Health Care System	
SBP2	Patient Safety and Quality Improvement	X
PBLI1	Incorporation of Quality Improvement and Patient Safety Initiatives into Personal Practice	
PBLI2	Analysis of Practice to Identify Areas in Need of Improvement	X
PBLI3	Self-directed Learning	
PBLI4	Education of Patient, Families, Students, Residents, and Other Health Professionals	
P1	Responsibility to Patients, Families, and Society	X
P2	Honesty, Integrity, and Ethical Behavior	X
P3	Commitment to Institution, Department, and Colleagues	
P4	Receiving and Giving Feedback	
P5	Responsibility to Maintain Personal Emotional, Physical, and Mental Health	
ICS1	Communication with Patients and Families	
ICS2	Communication with Other Professionals	X
ICS3	Team and Leadership Skills	X

Patient Care (PC)
Medical Knowledge (MK)
System-based Practice (SBP)
Practice-based Learning and Improvement (PBLI)
Professionalism (P)
Interpersonal and Communication Skills (ICS)

Learning Objectives

At the end of this simulation, the learner will be able to:

1. **Classify** the anesthetic risks with smoking, recommendations regarding perioperative smoking cessation, and perioperative management of patients with a smoking history (PC, MK, PLI, CS, PR, SBP).
2. **Describe** the physiologic changes associated with the prone position as well as the risks of and processes for safely positioning a patient supine (PC, MK, PLI, CS).
3. **Identify** the differential diagnoses for loss of $ETCO_2$ (PC, MK).
4. **Formulate** a plan to rule out causes of total airway obstruction (PC, MK, PLI).
5. **Manage** hypotension and tachycardia (PC, MK, CS, PLI).
6. **Prioritize and delegate** tasks in a time of crisis (PC, CS, PLI).
7. **Employ** the treatment of ventricular fibrillation as a result of ischemia. (PC, MK, CS, PLI)
8. **Lead** a discussion with the operating room team regarding the decision to continue surgery post crisis (PC, PLI, CS, PR, SBP)
9. **Identify and describe** elements of crisis resource management

Simulation Performance Objectives

1. **Recognize** capnograph and high inspiratory pressure changes which signify complete airway obstruction.
2. **Mobilize** resources by calling for help early during medical emergency.
3. **Communicate** diagnosis to health care team promptly to initiate collaborative action (removal of C-arm, retrieval of gurney and securing of surgical site in preparation for flip to supine position).
4. **Initiate** sequence of actions to rule out causes of total airway obstruction (increase fraction of inspired oxygen (FiO2) to 100%, verify peak inspiratory pressure (PIP), switch to manual ventilation using reservoir bag, disconnect Y piece from endotracheal tube (ETT) and squeeze bag, auscultate both sides of patient's chest).
5. **Anticipate** onset of hypoxia upon inability to ventilate and recognize subsequent hypoxemia.
6. **Flip** patient to supine position to optimize airway management.
7. **Suction** ETT and consider replacing ETT.
8. **Initiate** a discussion with the surgeon regarding options for positioning and modification of procedure.

Guided Study Questions

1. What are the perioperative anesthetic considerations for the patient with a smoking history?
2. What risks are associated with prone positioning?
3. What is the differential diagnosis for hypocarbia on the capnograph?
4. What logistical considerations or resources should you think about with a patient in prone position in the operating room?
5. What is the management and treatment of intraoperative hypoxemia?
6. Does your organization have a difficult airway algorithm? Where can you reference it?
7. What are the core principles or crisis resource management?

Reference used

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6. Law JA, Mariotti C, Mullen T: *Failure of both suction catheter passage and bronchoscopy to diagnose an obstructing tracheal mucus plug.* Can J Anesth (2012) 59:911-912
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Didactic

None

Section 3: Preparation

Equipment (list specific quantities, sizes, and brand)

1. Simulator
    a. SimMan 3G
2. Machines
    a. Crash cart with adult defibrillator pads
    b. Anesthesia machine
    c. C-Arm
    d. Suction with flexible tubing
    e. C-MAC or Glidescope (Video Intubation)
    f. BairHugger (patient warmer)
3. Misc
    a. Medicine cart
    b. Monitor
    c. OR table/bed
    d. IV pole with IV line taped to the OR bed
    e. Pulse Ox connected to simulator
    f. EKG leads connected to simulator
    g. BP cuff on simulator
    h. Gurney

Supplies (list specific quantities, sizes, and brand)

1. Airway
    a. Adult nasal cannula
    b. Adult face mask
    c. Adult non-rebreather mask
    d. Purple Oral airway
    e. 26 Nasal airway
    f. 7.0 or 7.5 endotracheal tube with lubricant on end to simulate mucous
    g. Laryngoscope with size 3 MAC blade
    h. Adult BVM
2. Syringes/Bags
    a. Two 1000mL bag Sterile Water labeled as Normal Saline already taped to the OR table
    b. 100mL bag epinephrine
    c. 100mL bag phenylephrine
    d. 10ml syringe epinephrine
    e. 10ml syringe phenylephrine
    f. 10ml syringe ephedrine
3. Kits
    a. Central line
    b. Arterial line
4. Misc
    a. Ioban set on OR table
    b. Anesthesia record in a manila folder on the anesthesia machine

c. Patient band on top of manila folder
d. Bare hugger/blankets
e. New endotracheal tube
f. Foam to place under chest of simulator
g. Foam to place under face of simulator

Monitors Displayed (specific set-up)

1. OR wave-form set-up

Moulage (if applicable)

1. Bouffant cap on simulator
2. Drape
3. Incision moulage placed on back of simulator
4. Bloody rags
5. Wrist band
6. Anesthesia record

Supporting Materials (ensure to check the computer)

1. Images
    a. CXR – Normal
2. Labs
    a. ABG - Labs are printed out and given to the confederate to hand to the participant
3. Handouts - n/a
4. Misc
    a. Use EKG generated from Laerdal software

Confederates:

- Surgeon
- 1st assist
- OR Nurse
- Off-going anesthesia
- Additional help (if required)

Time Duration

Set-up	15 minutes
Preparation	10 minutes
Simulation	15 minutes
Debrief	30 minutes

Section 4: Simulation Exercise

Information for Participant

Case Stem to be read to participants:

A 42-year-old male outpatient with a history of chronic back pain and mild hypertension presents for T7-T8 laminectomy and fusion in the prone position. The patient is 5'6" (168 cm) and 150 lbs (68 Kg). He takes gabapentin and hydrocodone for pain and has no allergies. He endorses a 30-pack-year history of smoking as well as weekend drinking. Vitals: HR: 76 bpm, BP: 142/87, RR: 18, Sat: 97% on room air, Temp: 36.8, Pain: 3/10. Physical exam is unremarkable. Laboratory values are within normal limits.

Additional information if asked:

- IV access: 1 Peripheral IV
- Last cigarette: this morning
- EKG and CXR performed as part of preoperative work-up. (hard copy available to learner)
- Estimated surgery time: 3 hours
- Post surgical plan: extubate and admit to floor

Information for Facilitator/Simulator Operator Only

Background and briefing information:
The case starts with a handoff while the patient is already positioned prone, prepped and draped. Shortly after the C-arm is brought in, the patient experiences a total airway obstruction.

Initial presentation:
Total airway occlusion is indicated by high peak inspiratory pressure alarm and loss of $ETCO_2$ and ventilation. Initially there is no change in vitals.

How the Scenario unfolds:
The patient develops sudden airway obstruction followed by hypoxemia[2] that does not resolve unless a mucous plug is suspected and the endotracheal tube is suctioned. The scenario is designed so that if the learner tries to intubate in the prone position, they will be unsuccessful. The mucus plug will not resolve until the learner positions the patient in the supine position and suctions and/or replaces the ET tube.

Applicability of the Scenario
This scenario has been delivered twelve times to anesthesia residents with good results although not all the residents determined the root cause of the airway issue. As stated above, the case requires the learner to troubleshoot the airway obstruction while in the prone position and make a determination that the patient needs to be positioned supine in order to properly assess the airway. In 92 percent of the cases, the residents initiated a termination of surgery and re-positioned the patient (supine) to assess/optimize an airway. In 100 percent of the cases, the anesthesia residents attempted to suction in the prone position prior (scenario designed for plug not to resolve in prone position) to repositioning supine (Table 3). This scenario has also been used by fully-trained anesthesiologists participating in Maintenance in Certification of Anesthesia (MOCA) courses three times to date. MOCA is an opportunity for physicians to improve their skills in six general competencies: Medical Knowledge; Patient Care; Practice-Based Learning and Improvement; Professionalism; Interpersonal and Communication Skills; and Systems-Based Practice[1]. In 100 percent of the cases performed during MOCA® course the patient was suctioned and re-positioned supine (Table 3). This case also presents excellent examples to highlight the core principles of crisis resource management (CRM): Call for help early, anticipate and plan, know the environment, use all information, allocate attention wisely, mobilize resources, use cognitive aids, communicate effectively, distribute the workload, establish role clarity, and designate leadership[7]. CRM will be discussed using reflective debriefing at the conclusion of the case. Overall, a total of 15 providers have had this case presentation and 40 providers

have surveyed the case and participated in the debriefing sessions following the scenarios (Table 2).

Actor Information and Script

The actors involved in this scenario, except the OR nurse, are simulation staff. To give the scenario the realism, the OR nurse actor is a registered nurse or other well-trained simulation staff (note: this position may be filled by other medical professionals). The staff has executed this scenario several times, but training and test (dry) runs prior are essential to performing this scenario to achieve stated objectives.

- Surgeon
  During handoff, the surgeon will simulate doing surgery and have small talk with first assist.
  "What's going on? – when learner starts struggling
  "I'm nowhere close to being done" – if learner states they need to stop surgery
  "Lets get an Ioban on" – if learner decides to reposition to supine

- 1st assist
  This actor will have no specific scripting. This actor will perform small talk with the surgeon actor. This actor will also assist the OR nurse in retrieving the bed and repositioning of patient. The 1st assist actor will also be the individual that operates the modified suction machine.

- OR Nurse
  The OR nurse assists the learner and calling in resources, bringing in bed, hanging medications etc…

- Off-going anesthesia
  Performs rushed handoff but answers all questions from the learner before leaving the OR.

- Additional help (if required)

Section 5: Debriefing and Evaluation

Debriefing

Reactions

1. What Happened?
2. How did you feel about _____?

Understanding (advocacy/inquiry)

1. What were you thinking when _____ happened?
2. It looked to me that _____?
3. I felt that you _____?
4. I saw you do/use _____?
5. What led you down that road?
6. Has this happened in your practice, if so how was it addressed?
7. Now that you have completed this simulation, how will this (if any) change your practice?

Summary

1. Re-emphasize teamwork and CRM principles
2. What did you do well?
3. What could you have done better/differently? (+/▲)
4. Takeaway

Teaching Points

	Corresponding Learning Objective
Inspissation of mucus and other secretions, partial or even complete airway obstruction Clinical features resemble a PE (increased PIP, hypoxia)	**LO 2** **LO 3**
Causes of partial or complete airway Obstruction • Hyper secretion • Equipment failure o Machine o Breathing circuit o Tube placement	**LO 3**

Signs and Symptoms

	Corresponding Learning Objectives
Hypotension	**LO 5**
Tachycardia	**LO 5**
Capnograph ▲s	**LO 4**
High Inspiratory Pressure	**LO 4**
Hypoxia	**LO 4**
Arrhythmias	**LO 7**

Actions to Rule out Total Airway Obstruction

	Corresponding Learning Objectives
1. Increase FiO2 to 100%	**LO 4**
2. Verify peak inspiratory pressure	**LO 4**
3. Switch to manual ventilation	**LO 4**
4. Disconnect Y piece from the ET tube and squeeze bag	**LO 4**
5. Auscultate patient chest	**LO 4**

Diagnostic studies:

- CXR- normal
- ABG- increased A-a gradient
- Lung perfusion scans: decreased perfusion of involved parts of lungs without embolism

Risk factors

	Corresponding Learning Objectives
• Quadriplegic patients	**LO 2**
• Long duration of intubation (in PICU, 20% patients have partial ETT obstruction by mucoid impaction if intubated for long term)	**LO 2**
• Infrequent airway suctioning	**LO 2**
• URI	**LO 2**
• Small ETT	**LO 2**
• Smoking	**LO 1**
• Dehydration by low inspired humidity and increased viscosity of secretions	**LO 2**
• Continuous flow of dry inspired gases during anesthesia may cause secretions that flow initially into anterior part of ETT	**LO 2**

Treatment

	Corresponding Learning Objectives
• Re-intubate • Use tube exchanger to replace ETT • Suction • Fiber optic bronchoscopy • ACLS • ROSC Care • Case continuance post-event	**LO 9** **LO 6** **LO 7** **LO 8**

Crisis Resource Management

	Corresponding Learning Objectives
• Core Principles o Call for help early o Anticipate and plan o Know the environment o Use all available information o Allocate attention	**LO 9** **LO 6**

wisely o Mobilize resources o Use cognitive aids o Communicate effectively o Distribute the workload o Establish role clarity o Designate leadership • Team Management o Role identification and clarity o Assignment of tasks and workload distribution o Off-loading information o Resources o Communication	

Evaluation

[X]	Instructor Evaluation	[ ]	Pre-Test
[ ]	Performance Checklist	[ ]	Post-Test
[X]	BAT	[X]	Team Evaluation
[X]	ANTS		

Section 6: Instructor's Notes

- Ensure the simulation environment is properly set-up (see section 3)
- Orientation (start of session) done in another room
- Create a simulated OR environment

Briefing at start of session

1. Capabilities of simulator and simulation environment (done by simulation specialists)
2. Instructor the learner to call out all medications that are to be given and the associated dosages
3. Discussion of resources available
4. The learner should not assume there is a problem with the anesthesia machine or the simulator
5. Establish a safe environment by explaining this is a training environment
6. Learner will sign both a consent and a video recording policy letter

Appendix A
Simulation Events Table

Simulation Events Table

State	Patient Status	Student learning outcomes or actions desired and triggers	
1. Baseline (0:00)	Under anesthesia, positioned prone, hemodynamically stable. HR: 76 BP: 125/78 SPO2: 100% RR: 12 $ETCO_2$: 34	Learner Actions: o Antibiotic Administration o Time out	Operator: Teaching Points and objectives: o Prone positioning o Communication o Pre-operative antibiotics o Pre-operative time out Trigger: Enter room
2. Occlusive Airway obstruction (7:00) *Airway Obstruction*	High Peak Inspiratory Pressure alarm sounds. $ETCO_2$ tracing falls to zero. Ventilation ceases. HR: 76 BP: 125/78 SPO2: 100% RR: 0 $ETCO_2$: 0	Learner Actions: o Identify airway obstruction o Verify via auscultation and switching to manual ventilation o Initiate action to rule out causes o Alert Surgeon o Oxygen to 100% o Call for help o Anticipate need for flip to supine and take appropriate action	Operator: o Surgeon begins surgery then states "Bring in the C-arm" Teaching Points and Objectives: o Early recognition of critical event o Algorithm for high peak inspiratory pressure o Effective communication Trigger: "Bring in C-arm"
3. Initial desaturation (8:00) *Initial Desaturation*	Unable to ventilate; patient begins to desaturate and becomes tachycardic and hypertensive. HR: 112 BP: 154/93 SPO2: 92% RR: 0 $ETCO_2$: 0	Learner Actions: o Recognize need for urgent airway management o Attempt to suction o Flip patient to supine o Listen for breath sounds o Call for flexible bronchoscope	Operator: o If learner suctions ETT (supine) effectively proceed to state #7 o Otherwise proceed to state #4 after one minute

			Teaching Points and Objectives: o Recognize urgent need for airway management Trigger: One minute after initial trigger
Mucus Plug DOES NOT resolve with suctioning in prone position			
4. Further desaturation (10:00) *Continue*	Still unable to ventilate; patient continues to desaturate, further tachycardia develops and patient now becomes hypotensive. HR: 138 BP: 85/52 SPO2: 78% RR: 0 $ETCO_2$: 0	Learner Actions: o Suction o Flip supine if not already done o Suction ETT o Alternatively replace ETT o Alternatively remove ETT and bag mask patient o Call for help	Operator: o If learner suctions ETT (supine), extubates and bag masks or replaces ETT proceed to state #7. o Otherwise proceed to state #5 after one minute. Teaching Points and Objectives: o Management of hypotension and tachycardia Trigger: Two minutes after initial trigger if insufficient airway management
Mucus Plug DOES NOT resolve with suctioning in prone position			
5. Electrocardiogram changes (12:00) *ECG Changes*	Ischemic changes develop HR: 185 BP: 65/30 SPO2: 50% RR: 0 $ETCO_2$: 0	Learner Actions: o Recognize myocardial ischemia o Correlate changes with acute hypoxemia	Operator: o Patient develops acute ST elevations on rhythm strip o Hemodynamics improve transiently with vasopressor or fluids Teaching Points and Objectives: o Importance of ABCs o Maintain focus on airway management o Management of intraoperative ischemic changes

			Trigger: If insufficient airway management
6. .Deteriorate to an unstable rhythm (14:00) *V-Fib*	Bradycardia develops and proceeds to v-fib arrest HR: 30 then V-fib BP: 32/30 SPO2:not available RR: 0 $ETCO_2$: 0	Learner Actions: o Anticipate cardiac arrest o Call for crash cart o Call for help *Note – if the learner does not discover the issue at this point, the 1st assist should suggest that the patient be positioned supine and call for additional help	Operator: o Patient develops bradycardia which proceeds to V-fib Teaching Points and Objectives: o Review treatment of bradycardia and V-fib arrest o Call for help early and mobilize resources early Trigger: If insufficient airway management
7. Patient Recovery (8:00 – 14:00) *Resolution*	Patient stabilizes HR: 85 BP: 115/71 SPO2: 100% RR: 12 $ETCO_2$: 54	Learner Actions: o Call for ABG o Discuss disposition of patient with surgical team	Operator: o Patient develops stable sinus rhythm. Teaching Points and Objectives: o Discuss post event treatment and monitoring Trigger: Appropriate airway management

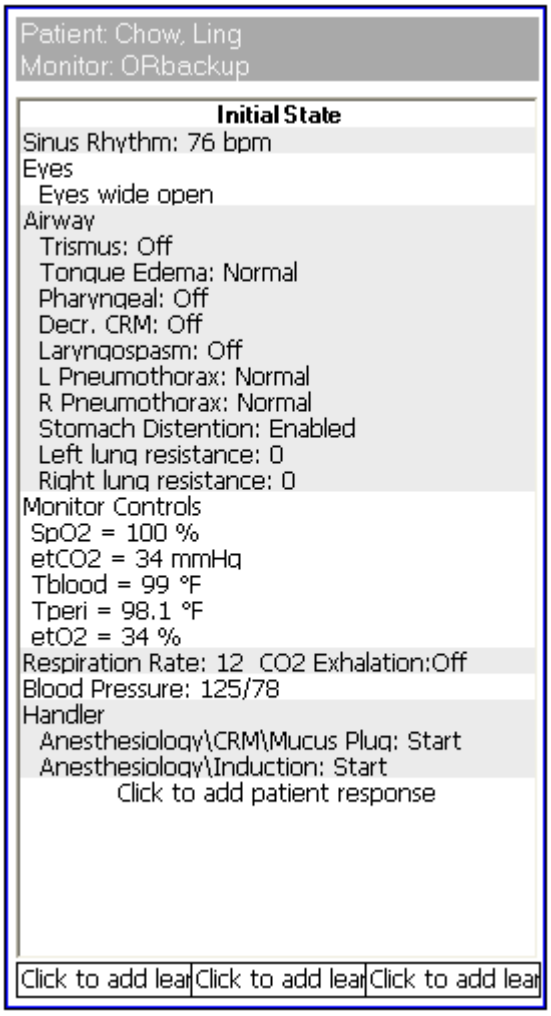
Appendix B
Imagery File Descriptions

Picture 1 (eggcrate.tiff)
The simulator just after the point in the scenario that they are returned to supine position. Here you can clearly see the egg crate that was while the simulation was in the prone position.

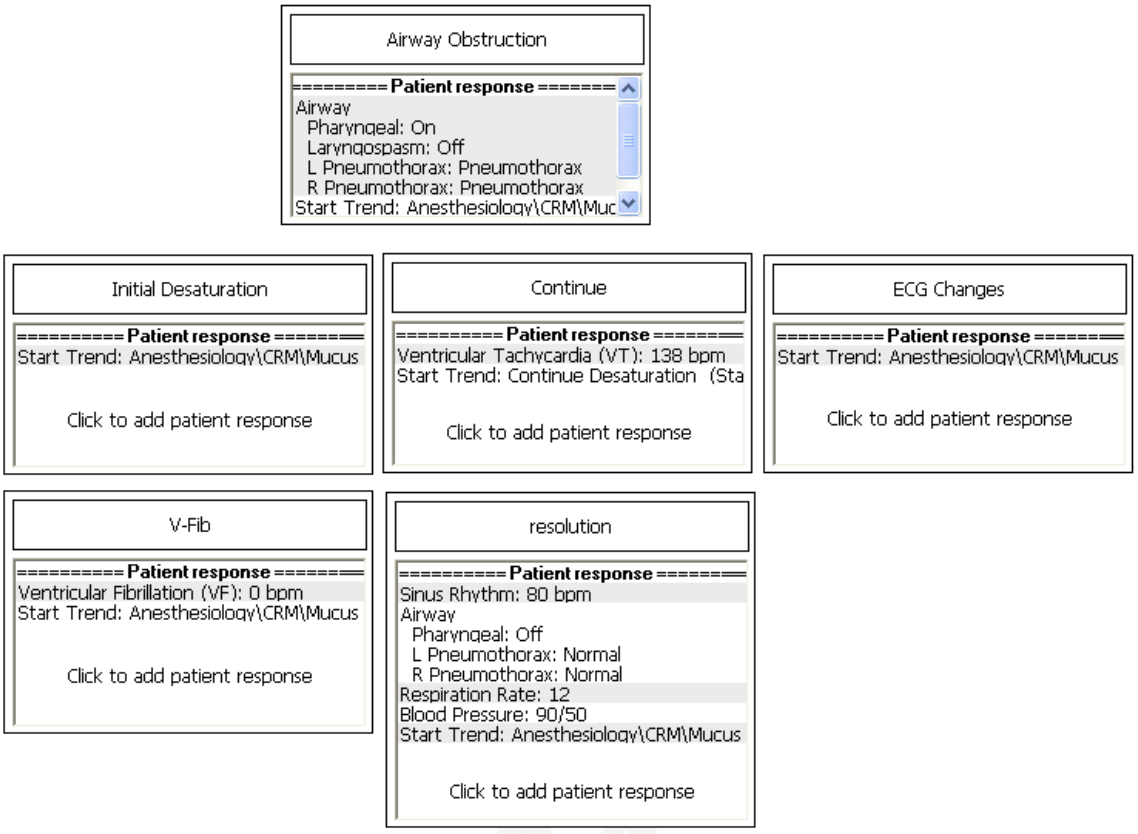
Picture 2 (IMG_1385)
Photo of close-up of modified suction tubing. The CO2 air sampling line is routed through the suction tubing and glued in place. A three-way stopcock was added to the end of the air sampling port. A modified naso-pharyngeal airway was added on to the end the suction tubing and glued in place to accommodate suction canister port. See supplementary set up.

Picture 3 (IMG_1386)
Photo of modified suction tubing into a standard suction canister.

Picture 4 (Initial State.tiff)
This picture shows how state 1 (initial state) was programmed using the Laerdal SimMan 3G software.



Picture 5 (Handlers.tiff)
Represents the handlers associated with this scenario



Picture 6
Arterial Blood Gas

ABG:

pH	7.23
PCO2	55
PO2	180
HCO3	24
Hgb	9
Hct	28

Picture 7
Chest X-ray

Appendix C
Supplementary Setup

Simulator: Laerdal SimMan 3G

Simulator set-up prior to case: The Laerdal SimMan 3G was intubated and set up in the prone position. Because of the CPR compression sensors in the chest of the SimMan 3G, we found that "eggcrate" foam placed on the chest decreases the likelihood of false/errant data in the SimMan 3G software. We place the head to the left side to reduce resistance (as much as the simulator would allow) on a "head doughnut."

Initially, the scenario started with the provider having to induce the patient and position in the prone position; however, we were having problems properly positioning the SimMan 3G to where the chest compression sensors weren't activating. Additionally, if the case stated with induction, then there was no way for the simulation specialist to "goop" up the distal end of the endotracheal tube.

Simulation Operation during Case

Mucus Plug

In order to simulate/replicate a mucus plug, we "gooped" up the distal end of the endotracheal tube with surgical lubricant that we added a little yellow and brown food coloring. We had initially wanted to physically place an obstruction in the trachea of the SimMan 3G; however, we were apprehensive of lodging the obstruction further and not being able to retrieve it.

Mucus plug programming

In order to simulate/replicate the mucus plug, through handlers and trends (see picture 5), the pulmonary resistance was raised and compliance was decreased. The ETCO2 was set to 0, ventilations were set to 0.

Suction

In order to simulate actual secretions we modified standard suction tubing so participants could visualize mucus in the tubing. We placed smaller tubing (in our case, we used a disposable anesthesia gas sampling line) into the suction tubing (see picture 2). It exited the suction tubing at the proximal end just before it attach to the suction canister. Because we had to cut the end of the suction tube to insert the gas sampling tube, we then cut a nasopharyngeal airway end (in our case, we used a Rusch 30 French) use as a connection piece for the canister and super glued the nasopharyngeal airway piece and the gas sampling line in place (see picture 3). The gas sampling line was placed (on the distal end) approximately 1 inch from the tip of the yankauer suction wand. The smaller tubing was attached to 500ml bag of yellowish-brown liquid. When the suction was started, a background technician or confederate opened the bag and pushed the fluid. Once the fluid entered the end of the suction, it was sucked up as if it were real suction, and fluid was being evacuated nominally. At time of this submission, are also adapting this method to the create a set up for the soft suction catheter that would actually go down the endotracheal tube.

Appendix D
Tables

Table 1

	Number of Times
Anesthesia residents	12
Maintenance of Certification in Anesthesia (MOCA)	3
Total	**15**
Case surveyed (no active participation in case) but participated in debriefing	40

All data is from 2010-2011

Table 2 – Applicability of Scenario

Residents n= 12, FT Anes n=3	**Residents**	**Fully-Trained Anesthesiologists (MOCA)**
Scenario Performance		
Provided suctioning (prone positioning)	12 (100%)	3 (100%)
Terminated case until airway was patent	8 (66%)	3 (100%)
Re-positioned to supine position	11 (92%)	3 (100%)
Crisis Resource Management		
Called for assistance (Mobilized Resources)	12 (100%)	3 (100%)
Communication effectively*	3 (25%)	2 (66%)
Used all available information	12 (100%)	3 (100%)
Used Cognitive Aids+	N/A	N/A
Distributed the workload++	N/A	N/A

All data is from 2010-2011

* - Use of closed loop communication > 50% of scenario time
+ - Cognitive aids were not available
++ - This was not assessed