

New Hampshire Board of Dental Examiners

EMERGENCY SCENARIOS

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CRITICAL PERFORMANCE POINTS MODERATE SEDATION PERMIT HOLDERS

Introduction

The objective of this exercise is to assess the capability of the office team, both clinical staff and administrative staff, to respond appropriately for the best outcome for the patient in an urgent/emergent condition.

Technical skills are the skills involved in the procedural response to the emergency, including but not limited to knowledge of the BLS-HCP algorithms, ACLS algorithms, treatment algorithms of other clinical presentations.

Non-technical skills include but are not limited to team performance, closed loop communication, understanding preassigned roles and responsibilities of team members, interaction and efficiency between administrative staff, clinical staff and the team leader, usually the doctor, use of scripted communication for infrequently performed events , i.e., EMS activation and management of persons in the office not immediately involved with the emergency.

General performance points include but are not limited to the use of checklists and scripts, use of cognitive aids and assistance, performance of differential diagnosis of clinical presentation, primary assessment, correct intervention, correct performance of that intervention, reassessment of efficacy of treatment/intervention with reassessment of original diagnosis and intervention based on patient condition.

Clinical Scenarios to Be Evaluated

(See Evaluation Form for complete office evaluation process)

Upper Airway Obstruction	Pass	Fail	Cardiac Arrest (BLS-HCP)	Pass	Fail
Bronchospasm	Pass	Fail	Syncope	Pass	Fail
Emesis & Aspiration	Pass	Fail	Hypertensive Crisis	Pass	Fail
Foreign Body in Airway	Pass	Fail	Allergic Reaction	Pass	Fail
Angina	Pass	Fail	Hyperventilation	Pass	Fail
Acute MI	Pass	Fail	Seizure/Convulsions	Pass	Fail

UPPER AIRWAY OBSTRUCTION / BRONCHOSPASM / EMESIS / ASPIRATION / and BRONCHOSPASM

Scenario: A 30 year old ♂ presents for planned procedure. Anesthetic treatment plan is doctor's choice.

PMH Mild exercise-induced asthma. Albuterol used prior to work outs. **NKDA**

Baseline VS 135/78 P 78 5' 11" 195# 88 kg BMI 27 (Overweight)

Upper Airway Obstruction

The procedure begins, and the patient is comfortable. He begins to snore. His SpO₂ drops from 99 to 89 over 1 minute. Doctor and staff should manage this with airway maneuver and OP or NP airway, and articulate the indications for positive pressure ventilation (apnea, hypopnea, bradypnea).

Lower Airway Obstruction

The initial measures are ineffective. Ventilation remains difficult SpO₂ is 91. Consider differential diagnosis of level of obstruction (Upper airway, glottis, lower airway) and clinical evaluation to confirm diagnosis (Airway sounds, auscultation of lungs). If upper airway obstruction remains, LMA insertion should be considered. If lower airway obstruction is diagnosed, treatment of bronchospasm should ensue.

Upper Airway Obstruction Technical Skills

Suction and tongue grasp with protraction

Triple/quadruple airway maneuver (head tilt, chin lift, jaw thrust, turning head to one side)

Indications, Sizing and insertion of oral airway, nasopharyngeal airway

Bag Valve Mask ventilation with emphasis on mask seal with 2 person ventilation for positive pressure ventilation

Consideration of reversal agent (Proper drug, dose and route, using closed loop communication)

Reassess ABC after intervention. If no or insufficient improvement, assess effectiveness of intervention and expand differential diagnosis

Lower Airway Obstruction Technical Skills

Auscultate lungs

Recognize need for medical intervention: Albuterol 2 puffs if patient non-obtunded and cooperative, if patient non-responsive or non-cooperative, IM epinephrine with epi pen or 0.3 mg/0.3 mL of 1:1000 epinephrine in deltoid or vastus lateralis

Discuss timing of 911 call

Emesis and Aspiration Technical Skills

Reassess ABC, recognizing that positive pressure aspiration can lead to gastric insufflation, and increased risk for emesis

Position patient in Trendelenberg (if obtunded, to bring emesis to nasopharynx, away from hypopharynx)

Roll patient to right side to soil right lung, due to obtuse angle of right main stem bronchus, and likelihood of aspiration into the right lung, trying to spare the left lung

Aggressive high speed suctioning

Auscultate lungs

Immediate 911 for transfer to acute care facility for diagnosis and treatment if evidence of aspiration (auscultate lungs for wheezing or rales, evaluate oxygenation)

Supplement oxygen: nonrebreather full face mask, assisted with Ambu, LMA

Bronchospasm Consider albuterol or IM epinephrine

FOREIGN BODY IN AIRWAY

Scenario: A 35 year old ♀ presents for restorative and routine extractions using doctor's preferred sedation regimen.

PMH Negative NKDA

The case is proceeding well. During the extraction, the tooth falls behind the throat pack or drape and is visible in the posterior oropharynx. How is this managed?

The tooth is not recovered, and disappears from sight. How is this managed?

Foreign Body in Airway Technical Skills

FB Visible in awake or obtunded patient

Delicate directed strong suction to retrieve foreign body OR McGill forceps or other instrument to grasp foreign body.

FB Not visible in awake patient

No sign of airway distress,

possibly assume FB in stomach? Instructions to patient to include airway distress instructions to present to ER

Airway distress

Use Heimlich maneuver

FB Not visible in obtunded patient

No sign of airway distress

Use laryngoscope to explore hypopharynx

Airway distress in obtunded patient

Use chest thrusts, laryngoscope, suction, McGill forceps

SYNCOPE

Scenario: A 32 year old ♀ patient presents for restorative work. Anesthesia treatment plan is doctor choice.

PMH Negative, NKDA She was extremely apprehensive during her consultation

Baseline vitals 120/77 P 102 5'6" 137# 62 kg BMI 23 (Normal)

The patient checks in for her appointment, NPO status confirmed. She turns to be seated, in very distressed condition. She proceeds to slump over in the chair, or to slide to the floor. The staff must manage this emergency.

Syncope Technical Skills

ABC's Airway Breathing Circulation assessment

Call for help

Position in Trendelenberg with feet 15 degrees above head

Obtain current vital signs with BP and pulse assessment in situ. Need to obtain manual BP cuff, stethoscope

O2 portable to waiting room

Cool towel to forehead, Ammonia vaporole

Anticipate tonic-clonic activity

Consider isotonic fluid bolus of 250-500 mL + according to medical history

Consider atropine or ephedrine IV

Continue procedure or not? Probably ok if healthy without co-morbidities

Concern and consider transfer if elderly, prolonged recovery, headache or chest pain present, incontinence

Questions for staff

How long should it take for patient to regain consciousness? Less than a minute.

What reasons other than anxiety can be responsible for symptomatic hypotension/ loss of consciousness? (MI, CVA, Hypoglycemia hypoxia, hypovolemia, OD, allergy/anaphylaxis, drug interaction, arrhythmia, PE)

Consider Vasopressor for symptomatic hypotension

Ephedrine (indirect α and β) normal HR 5 mg increments

Phenylephrine (direct α) tachycardia 0.1 mg increments

HYPERTENSION:

55 year old male presents for extraction of non-restorable teeth #'s: 17, 18 & 19 under combined intravenous sedation and local anesthetic technique.

PMHx: 1. Hypertension

2. Obstructive Sleep Apnea (Cpap compliant)

3. Obesity BMI 33

4. Dental phobia

Medications: 1. Lisinopril

2. Ativan prn

Allergy: NKDA and NKFA

**Shx: + Tobacco use – 10 pk year history
+ ETOH – 6 pk beer on weekends
Denies any illicit drug use**

Preoperative Vital Signs:

BP 152/93 P 94 RR 18 T 98.6 SpO2 97% (ra)

Pt reports NPO since Midnight and has not taken his BP medication today.

- 1. Discuss patient's history and any concerns with his presentation today:**

SBP 152 and DBP 93

Discuss the latest guidelines from the American College of Cardiology/American Heart Association (ACC/AHA)

Guidelines of Hypertension:

Hypertension — The following definitions and staging system, which are based upon appropriately measured blood pressure (table 1), were suggested in 2017 by the American College of Cardiology/American Heart Association (ACC/AHA); proper measurement technique is of paramount importance when identifying patients as having hypertension:

- Normal blood pressure – Systolic <120 mmHg and diastolic <80 mmHg**
- Elevated blood pressure – Systolic 120 to 129 mmHg and diastolic <80 mmHg**

AAOMS Anesthesia Manual 2012 8th Ed. – defines HYPERTENSION loosely as BP > 160/90

•Hypertension:

- Stage 1 – Systolic 130 to 139 mmHg or diastolic 80 to 89 mmHg**
- Stage 2 – Systolic at least 140 mmHg or diastolic at least 90 mmHg**

If there is a disparity in category between the systolic and diastolic pressures, the higher value determines the stage.

Isolated systolic hypertension is defined as a blood pressure ≥ 130 / < 80 mmHg, and isolated diastolic hypertension is defined as a blood pressure < 130 / ≥ 80 mmHg. Patients with a blood pressure ≥ 130 / ≥ 80 mmHg are considered to have mixed systolic/diastolic hypertension.

In clinical practice, patients who are taking medications for hypertension are usually defined as having hypertension, specifically “treated hypertension,” regardless of their observed blood pressure.

These definitions are based upon the relationship between blood pressure and the incidence of cardiovascular events in a large population, derived from numerous observational studies and randomized trials, in which blood pressure was measured in various types of office settings with variable equipment and technique

Hypertensive urgency and emergency — Severe hypertension (usually a diastolic blood pressure above 120 mmHg) with evidence of acute end-organ damage is defined as a hypertensive emergency. Hypertensive emergencies can be life-threatening and require immediate treatment, usually with parenteral medications in a monitored setting.

Severe hypertension (usually a diastolic blood pressure above 120 mmHg) in asymptomatic patients who are not experiencing acute end-organ damage is referred to as hypertensive urgency. There is no proven benefit from rapid reduction in blood pressure in such patients. Hypertensive urgency is common in clinical practice, especially among patients with known hypertension who are not fully adherent to their medications. Most cases of asymptomatic blood pressure elevations can be addressed in the office setting without referral to a higher level of care.

- 2. Discuss the benefits proceeding with IV sedation? Risks of doing so?**
- 3. Discuss when you would NOT proceed with proposed elective dental surgery given the preoperative BP readings if ever?**

Young healthy patients with Hypertension vs Older patients

Preoperatively: Pt should have been advised to continue with his antihypertensive medication with sip of H₂O. Alternatively, with his preoperative elevated BP – may consider having him take additional dose of his regular BP medication or

Clonidine (Catapres) 0.2 mg PO - may give additional 0.1 mg dose every 1 hour to maximum of 0.6 mg

IV is placed with a 22 g AC in his right DOH

Initially, Midazolam 2 mg IV is given with Fentanyl 50 mcg IV

After 5 minutes, vitals are: BP 210 / 80 P 96 RR 18 SPO₂ 93% on supplemental Oxygen 3 L/min

Frequent causes for increased blood pressure intraoperatively:

- Depth of Anesthesia**
- Hypercarbia**
- Hypoxia**
- Pain**
- Anxiety**
- Vasoconstrictors**
- Pain**
- Emergency delirium**

- Bladder Distention
- Fluid Overload
- Hyperthermia

Most common cause of intraoperative Hypertension

- Inadequate obtundation of the pain reflex secondary to depth of anesthesia
- Next most common cause of Intraoperative Hypertension is sympathoadrenal stimulation with increased release catecholamines secondary to hypercarbia.
- Mild hypoxia causes increases in heart rate and blood pressure with severe hypoxia resulting in dysrhythmia and hypotension which consequently may lead to cardiac arrest.

Treatment of intraoperative HYPERTENSION:

Analgesia:

Is the elevated BP reading due to pain? Consider Narcotic or additional Local Anesthesia as appropriate

INCREASING DEPTH OF ANESTHESIA OR ANALGESIA USUALLY WILL DECREASE HEART AND RATE AND BLOOD PRESSURE

Beta-Blockers:

1. Esmolol – 500 mcg/kg over 1 minute; follow with 50-200 mcg/kg/min infusion to desired BP

→Beta-1 Selective adrenergic receptor blocker w/short duration of action and easily titrated thus 1st line treatment for perioperative hypertension

T1/2 ~ 9 minutes

→INDICATIONS: The treatment of hypertension and tachycardia and helpful for treatment of SVT, A-Fib, A-Flutter and non-compensatory tachycardia

→CONTRAINDICATIONS:

- Sinus Bradycardia
- Greater than 1st degree Heart Block
- Cardiogenic Shock
- Overt Heart Failure

Esmolol should be carefully used in patients with a history of BRONCHOSPASTIC DISEASE And should NOT BE USED THROUGH A SMALL VEIN b/c increased risk for tissue irritation and damage

2. Labetalol –DOSE OF 5-20 mg IV over 2 minutes FOLLOWED BY INFUSION OF 2 mg / min (MAX DOSAGE OF 300 mg) WITH ONSET OF ACTION 5 MINUTES AND DURATION OF ACTION 3-6 HOURS

- ➔ **Selective Alpha-1-Blocker and Non-Selective Beta-Blocker**
- ➔ **Indicated for patients with a rapid heart rate with no history of bronchospastic airway disease**
- ➔ **Contraindicated in patients with ASTHMA OR REACTIVE AIRWAY DISEASE**

The patient who may tolerate an increase in Heart Rate and Cardiac Output but has a history of ASTHMA

May want to treat the patient with a DIRECT VASODILATOR:

**HYDRALAZINE – DOSE 5-25 mg IV with onset of action = 5 minutes and DOA ~ 2 hours
Is associated with reflex tachycardia and hypotension**

Discuss some adverse reactions to ANTIHYPERTENSIVE MEDICATIONS:

- 1. Orthostatic Hypotension**
- 2. Lightheadedness**
- 3. Syncope**
- 4. Hypokalemia**
- 5. Headache (Hydralazine)**

HYPOTENSION:

21 year old female presents for extraction of impacted teeth #'s 1, 16, 17 and 32 under total intravenous anesthesia.

PMHx: Non-contributory

MEDS: Ortho-Tricycline

Allergy: Penicillin and Soy

PSHx: None

Shx: + ½ ppd smoking; No ETOH or Illicit drug use

Weight: 102 lbs Height: 5'2

Preoperative Vitals: 102/55 P 55 RR: 14 SpO2 97 % room air T 99.1

You apply standard ASA monitors and observe a sinus bradycardia on the monitor

What can you garner from her medical history?

- **Bradycardia – is she athletic? A runner? Is it sinus bradycardia? Or an AV block?**

- + smoker and taking OCP's – At risk for?? DVT and hypercoagulability
- Allergy to Soy – any contraindications to use of certain sedative hypnotics? Ie. Propofol can be administered but pay be vigilant for possible allergic reactions and ready to treat as necessary with follow up w/Allergy Specialist

You begin with Midazolam 2 mg Fentanyl 25 mcg and her vitals after 5 minutes:

BP 78/32 P 48 RR 18 Spo2 96% on 3 L/min of Oxygen via NC

Comment on her current BP and HR – Hypotensive and Bradycardic

WHAT INTERVENTIONS WILL YOU CONSIDER?

--POSITIONAL CHANGES → Trendelenburg position

--HR OF 48 ? – SINUS BRADYCARDIA –consider use of Atropine 0.5 – 1 mg IV q3-5 min intervals max of 3 mg

--BP – HYPOTENSION – FLUID BOLUS FOLLOWED BY USE OF A PRESSOR – WHICH ONE?

EPHEDRINE GIVEN HER SINUS BRADYCARDIA IS Rx OF CHOICE GIVEN HER HEART RATE

--IS THE HYPOTENSION AND BRADYCARDIA SECONDARY TO OPIOID? NOT LIKELY GIVEN THE LOW DOSE ADMINISTERED. HOWEVER, IF THE PATIENT HAD RECEIVED FENTANYL 100 mcg – GIVEN HER BODY HABITUS ONE MIGHT REVERSE WITH Naloxone 0.1-0.2 mg IV at 2-3 minute intervals for partial opioid reversal vs. 0.4 -2.0 mg IV for opioid overdose and may repeat q2-3 minute intervals up to 10 mg

HYPOTENSION:

Etiology of preoperative Hypotension:

- concomitant diseases
- psychologic factors
- postural changes
- Hypovolemia secondary to infection, dehydration, or fasting status
- Excessive premedication or allergic reactions

ETIOLOGY OF INTRAOPERATIVE HYPOTENSION:

- Anesthetic OD
- Drug interactions
- Allergy
- Cardiovascular Compromise
- Hypoxemia
- Hypercarbia
- Hypovolemia
 - Dehydration
 - Inadequate Fluid Replacement
 - Infection

Treatment of HYPOTENSION should be directed to the CAUSE of Hypotension

First line of treatment includes adjusting the level of Anesthesia, then CESSATION OF THE SURGERY and placement of patient in TRENDELENBURG position with 100% Oxygen and confirm adequate airway, oxygenation and ventilation.

Next, consider a fluid bolus of isotonic fluids and if persistent hypotension is noted after checking vital signs – consider use of a PRESSOR bolus with EPHEDRINE or PHENYLEPHRINE

EPHEDRINE:

Mechanism of Action:

Releases tissue stores of norepinephrine and thereby produces an alpha- and beta-adrenergic stimulation; longer-acting and less potent than epinephrine

- Excellent agent for treating HYPOTENSION during INTRAOPERATIVE and POSTOPERATIVE STATES
- 50 mg / mL Vial diluted with 9 mL of Normal Saline to make a 5 mg / mL solution administered in a dose of 2.5 – 5.0 mg IV which can be repeated until the BP is stabilized
- ONSET ~ 1 minute with a peak in 15 minutes with DOA ~ 1 hour

PHENYLEPHRINE (NEO-SYNEPHRINE):

- Primarily an ALPHA STIMULATOR increasing both the SBP and DBP
 - Reflex BRADYCARDIA may occur due to an increase in arterial pressure
 - Direct Inotropic myocardial effect
 - Indicated for hypotension associated with a HR > 120/min
 - Supplied in a 10 mg / ml single dose vial → DILUTE IN 9 mL of NS and then DISCARD 9 mL and draw up another 9 mL of NS to create a 0.1 mg / mL concentration and administer
 - 0.1 mg in 1 ml increments until desired effects achieved
 - Effects seen in ~ 1 min and lasts ~ 20 minutes

POSTOPERATIVE HYPOTENSION:

- Most frequent cause relates to residual anesthetic drugs, postanesthetic postural sensitivity, hypovolemia, cardiac dysrhythmias, severe hypoxemia or hypercarbia, allergic drug reaction, Myocardial Ischemia/Infarct, Pulmonary Embolism, Sepsis, Pneumothorax, Cardiac Tamponade and Adrenal Insufficiency
- Blood volume changes in our ambulatory surgical patient population are usually attributed to the effects of narcotics and barbiturates. Any decrease in circulatory

capacity resulting from venous dilation is sufficient to decrease BP predisposing the patient to orthostatic changes.

- ➔ Patients who do not respond to positional changes to augment venous return, while ensuring proper ventilation and oxygenation with IV Fluid boluses should be suspected of an allergic reaction, a cardiac event or consideration of adrenal insufficiency if patient has a history of exogenous corticosteroid use

CHEST PAIN / MI / CARDIAC ARREST

Scenario: A 44 year old ♂ presents for restorative care with doctor's sedation regimen. PMH significant for hypertension. Meds HCtZ 50 mg. VS 140/90 P 80 SpO2 RA 98%.

What monitors does the doctor use?

As the case begins, the patient complains of chest pain VS 180/105 P 90. How would you proceed? Intervention is performed, and VS reassessed. 180/110 P100. Chest pain continues. How would you proceed?

The patient becomes unresponsive. ABC's done. Patient is apneic and pulseless. How would you proceed?

Chest Pain Technical Skills

Evaluate for concern

Stable angina, worse with exercise, stress, known course

Unstable angina Crescendo, without trigger or atypical

Treatment

MONA, ABC

Nitroglycerin 0.3 mg SL q 5" if SBP>90 mmHg

Consider 911 call if pain not relieved with first NtG

Non-enteric ASA 160-325 mg Chew and swallow

Pain relief with narcotics Morphine or fentanyl

Proceeding to MI

CP unremitting, N/V, weakness, arrhythmia, ST segment changes, hypotension

Pulseless Patient Technical Skills

Confirm unresponsiveness

Call for 911 and AED

CAB Immediate defibrillation is main treatment

Get AED ASAP, turning on while delivering to patient position

While waiting for AED, immediately begin chest compressions 30:2, 2" depth, allow recoil, minimize interruptions of chest compressions

Shockable

Nonshockable

Give 1 shock

Resume CPR immediately x 2"

Resume CPR immediately x 2"

Check rhythm q 2" or ACLS protocol followed

Give second shock

ACLS protocol (Epi/Vasopressin)

Pulseless Patient NonTechnical Skills

Doctor demonstrates team leadership skills

Staff shows coordination of patient care and record keeping, using appropriate emergency forms

Staff and doctor show capability of smooth transfer to EMS with proper hand-off reports and emergency forms available for first responders.

ALLERGY / ANAPHYLAXIS

Scenario: A 45 year old ♂ presents for routine dental care using doctor's sedation regimen. He has been given antibiotics orally in the waiting room for prophylaxis for a TKR. He is otherwise healthy and has NKDA. While waiting, he develops pruritis on his chest and arms. How would you proceed?

This intervention is performed, but the patient begins to complain of dyspnea and throat constriction. He becomes agitated and confused. How would you proceed?

Allergy/Anaphylaxis Technical Skills

Cutaneous signs and symptoms: Benadryl IV/po 50 mg

Anaphylaxis Early and aggressive IM epinephrine 0.3 mg/0.3 mL 1:1000 vastus lateralis with 1- 1 ½” needle or EpiPen if patient is not obese. Preparation for second dose

Recognize tongue, airway edema, bronchospasm, and circulatory collapse (profound hypotension) of anaphylaxis and intervene early and aggressively with epinephrine.

Early 911 call

Supplemental oxygen with full face mask

Trendelenberg, legs elevated, IV fluids

Repeat epinephrine as needed q 3-5 min

HYPERVENTILATION

Scenario: A 20 year old ♀ presents for routine care with the doctor's routine sedation regimen. PMH Negative NKDA, VS 140/86 P 120. Prior to the procedure, she increases her respiratory rate from 20 to 40 breaths per minute, and begins to complain of cramping of her fingers and toes. What do you do?

Hyperventilation Technical Skills

Efforts to maintain oxygenation and decrease CO₂ elimination can include O₂ 6L via full face mask, rebreathing into paper bag or open circuit reservoir bag at a rate of 6-10 times a minute

Verbal coaching and reassurance

Consider sedation

SEIZURES

Scenario: A 22 year old ♀ presents for routine care with the doctor's routine sedation regimen. PMH: Epilepsy Meds: Keppra® (levetiracetam). VS are all WNL. The patient is seated in the chair, and as you begin the procedure, she loses consciousness, and begins thrashing about. What do you do?

Seizure Technical Skills

Activate EMS

Position the patient to prevent injury

Loosen clothing around neck

Place a pillow under the head

Consider a padded tongue blade placed between dental arches if the tongue is being traumatized

Consider cause: hypoglycemia, hypo/hyponatremia, hypomagnesemia, local anesthesia toxicity, allergic reaction with circulatory and respiratory inadequacy, hypotension

Consider IV anticonvulsants, cardiovascular support, airway

Appendix 1

Table 3. Blood Pressure Values and Clinical Action in Asymptomatic Hypertension

SBP, Mm Hg	DBP, mm Hg	Recommendation
<120	<80	Normal
120-139	80-89	High normal
140-159	90-99	Regular care, PCP follow-up
160-179	100-109	Proceed with definitive emergency care
		Proceed with noninvasive elective care
		PCP referral within 30 days
≥180	≥110	Proceed with noninvasive emergency care
		PCP referral within 7 days
≥220	≥120	Immediate referral, PCP or ED

Abbreviations: DBP, diastolic blood pressure; ED, emergency department; PCP, primary care physician; SBP, systolic blood pressure.