SUPRAGLOTTIC AIRWAY
SPECIAL TRAINING

Required curricula for conducting a
Supraglottic Airway Endorsement Course for EMTs-Basics

DRAFT 2 – REVISED March 2011

Health Systems Quality Assurance Division
Office of Emergency Medical and Trauma Prevention
Education, Training and Regional Support Section
P.O. Box 47853
Olympia, Washington 98504-7853
(360) 236-2840 or (800) 458-5281, Ext. 2 (in state only)
OBJECTIVES LEGEND
C=Cognitive P=Psychomotor A=Application
1=Knowledge
2=Application
3=Problem Solving Level

LESSON TERMINAL OBJECTIVE:
At the end of this lesson, the EMS provider will be able to utilize the assessment findings to formulate a field impression and implement the management plan for the patient experiencing an airway or breathing emergency.

COGNITIVE OBJECTIVES:
At the completion of this lesson, the EMS provider will be able to:
1. Identify the anatomy of the upper and lower airway. (C-1)
2. Describe the functions of the upper and lower airway. (C-1)
3. Define gag reflex. (C-1)
4. Establish the relationship between pulmonary circulation and respiration. (C-3)
5. Define the partial pressures and list the concentration of gases, which comprise atmospheric air. (C-1)
6. Describe the measurement of oxygen in the blood. (C-1)
7. Describe the measurement of carbon dioxide in the blood. (C-1)
8. List factors, which cause decreased oxygen concentrations in the blood. (C-1)
9. Define atelectasis. (C-1)
10. Define:
    ● Hypoxia. (C-1)
    ● Hypoxemia. (C-1)
11. List the factors, which increase carbon dioxide production in the body. (C-1)
12. List the factors, which decrease carbon dioxide elimination in the body. (C-1)
13. Describe the voluntary regulation of respiration. (C-1)
14. Describe the involuntary regulation of respiration. (C-1)
15. Describe the modified forms of respiration. (C-1)
16. Define normal respiratory rates for the adult, child, and infant. (C-1)
17. List the factors, which affect respiratory rate. (C-1)
18. List the factors, which affect respiratory depth. (C-1)
19. Define the normal tidal volumes for the adult, child, and infant. (C-1)
20. Explain the risk of infection to EMS providers associated with basic airway and advanced airway management. (C-1, C-3)
21. Explain the risk of infection to EMS providers associated with ventilation. (C-1, C-3)
22. Define pulsus paradoxes. (C-1)
23. Define partial airway obstruction: (C-1)
    ● With good air exchange.
    ● With poor air exchange.
24. Define complete airway obstruction. (C-1)

25. Review causes of upper airway obstruction, including: (C-1)
   - The tongue
   - Foreign body aspiration
   - Laryngeal spasm
   - Laryngeal edema
   - Trauma

26. Review causes of respiratory distress, including: (C-1)
   - Upper and lower airway obstruction
   - Inadequate ventilation
   - Impairment of the respiratory muscles
   - Impairment of the nervous system

27. Review and describe manual airway maneuvers, including: (C-1)
   - Opening the mouth
   - Head-tilt/chin-lift maneuver
   - Jaw-thrust maneuver
   - Modified jaw-thrust maneuver

28. Review the purpose for suctioning the upper airway. (C-1)

29. Review types of suction equipment, including: (C-1)
   - Hand-powered suction devices
   - Oxygen-powered portable suction devices
   - Battery-operated portable suction devices
   - Mounted vacuum-powered suction devices

30. Review types of suction catheters, including: (C-1)
   - Hard or rigid catheters
   - Soft catheters

31. Review techniques of suctioning the upper airway. (C-1)

32. Review special considerations of suctioning the upper airway. (C-1)

33. Describe the indications for suctioning the upper airway. (C-3)

34. Identify gastric distention. (C-1)

35. Describe indications for gastric decompression. (C-1)

36. Identify techniques of gastric decompression. (C-1)

37. Identify special considerations of gastric decompression. (C-1)

38. Describe indications and contraindications for inserting an airway adjunct, including: (C-1)
   - An oropharyngeal airway
   - A nasopharyngeal airway

39. Review the steps to insert an oropharyngeal airway. (C-1)

40. Review the steps to insert a nasopharyngeal airway. (C-1)
41. Review methods to perform ventilation, including: (C-1)
   - 1 person bag-valve-mask
   - 2 person bag-valve-mask
42. Review the advantage of the 2 person method to perform ventilation with the bag-valve-mask. (C-1)
43. Review and describe complications of ventilation with a bag-valve-mask. (C-1)
44. Identify the flow-restricted oxygen-powered ventilation device. (C-1)
45. Review the steps to perform ventilation with the flow-restricted oxygen-powered ventilation device (C-1)
46. Review complications of ventilation with the flow-restricted oxygen-powered ventilation device. (C-1)
47. Identify the automatic transport ventilator (ATV). (C-1)
48. List the steps to perform ventilation with the ATV. (C-1)
49. Describe complications of ventilation with the ATV. (C-1)
50. Identify special considerations in airway management and ventilation for patients with facial injuries. (C-1)
51. Describe indications to perform advanced airway management. (C-1)
52. Identify indications for multi-lumen intubation advanced airway. (C-1)
53. Describe indications and contraindications for inserting the multi-lumen airway. (C-1)
54. Discuss and understand the use of quantitative measurement of patient oxygenation and end-tidal CO₂. (C-1)
55. Describe selection of a multi-lumen airway to perform ventilation. (C-1, C-3)
56. List the equipment used to perform insertion of the multi-lumen airway. (C-1)
57. List the steps to insert a multi-lumen airway. (C-1)
58. Describe complications of insertion of a multi-lumen airway. (C-1)
59. Describe extubation of a multi-lumen airway. (C-1)
60. Identify the indications for extubation of a multi-lumen airway. (C-1)
61. Describe the complications of extubation of a multi-lumen airway. (C-1)

AFFECTIVE OBJECTIVES:
At the completion of this lesson, the EMS provider will be able to:
62. Explain the rationale for selection of each of the following basic approaches to airway management: (A-1)
   - Manual airway maneuvers
   - Oropharyngeal airway
   - Nasopharyngeal airway
63. Explain the rationale for use of the multi-lumen airway for airway management. (A-1)
64. Explain quantitative measurement of patient oxygenation with pulse oximetry and ventilation with capnometry and capnography, using end-tidal CO₂. (A-1)
65. Explain the rationale for selection of each of the following approaches to ventilation: (A-1)
   - Flow-restricted, oxygen powered ventilation device
   - Automatic transport ventilator
PSYCHOMOTOR OBJECTIVES:
At the completion of this lesson, EMS provider will be able to:
66. Perform standard precautions body substance isolation (BSI) procedures during basic airway management, advanced airway management, and ventilation. (P-1, P-2)
67. Perform quantitative measurement of patient oxygenation with pulse oximetry and ventilation with capnometry and capnography, using end-tidal CO₂ quantitative measurement of patient oxygenation and end-tidal CO₂. (P-1, P-2)
68. Perform suctioning of the upper airway by selecting a suction device, catheter, and technique. (C-3, P-2)
69. Perform suctioning of an advanced airway device by selecting a suction device, catheter, and technique. (C-3, P-2)
70. Perform insertion of an oropharyngeal airway. (P-1, P-2)
71. Perform insertion of a nasopharyngeal airway. (P-1, P-2)
72. Perform ventilation with a bag-valve-mask, including:(P-1,P-2)
   • 1 person method
   • 2 person method
73. Perform insertion of a multi-lumen airway. (P-1, P-2)
74. Perform extubation of a multi-lumen airway. (P-1, P-2)
Presentation
Declarative:

I. Introduction
   A. Need for oxygenation
      1. Primary Objective:
         a) Insure optimal Ventilation
            (1) Delivery of Oxygen
            (2) Elimination of CO$_2$
         b) Brain Death within 6 to 10 minutes
            Neurological function and tissue ischemia and infarction
      B. Major prehospital causes of death
         1. Preventable with:
            a) Early Detection
            b) Early Intervention
            c) Lay-Person BLS Education
      C. Most neglected of prehospital skills
         1. Basics taken for granted
            a) Poor Technique i.e.,:
               (1) BVM Seal
               (2) Improper Positioning
               (3) Failure to reassess the clinical presentation, anatomy, and anticipated difficult airway

II. Anatomy of Upper Airway
    A. Function of the upper airway
       1. Warm
       2. Filter
       3. Humidify
    B. Separated into
       1. Nasopharynx
       2. Oropharynx
    C. Nasopharynx
       1. Formed by the union of facial bones
       2. Orientation of Nasal floor is towards the ear not the eye
       3. Separated by Septum
       4. Lined with:
          a) Mucous Membranes
          b) Cilia
       5. Has Turbinates
          a) Parallel to nasal floor
          b) Provide increased surface area for air:
             (1) Filtration
             (2) Humidifying
(3) Warming

6. Contain Sinuses
   a) Cavities that appear to further trap bacteria and act as tributaries for fluid to and from eustachian Tube Advanced airways and Tear Ducts
      (1) Commonly become infected
      (2) Fracture of certain sinus bones may cause cerebrospinal Fluid (CSF) leak

7. Tissues extremely delicate and vascular
   a) Improper or overly aggressive placement of Tube advanced airways or airways will cause significant bleeding which may not be controlled by direct pressure.

8. Oropharynx
   a) Teeth
      (1) 32 Adult
      (2) Requires significant force to dislodge
      (3) May fracture or avulse causing obstruction
   b) Tongue
      (1) Large muscle attached at the Mandible and Hyoid Bones
      (2) Most common Airway Obstruction
   c) Palate
      (1) Roof of mouth separates oro/naso pharynx
         (a) Anterior is Hard Palate
         (b) Posterior (beyond the teeth) is Soft Palate
   d) Adenoids
      (1) Lymph tissue located in the mouth and nose that filters bacteria.
      (2) Frequently infect and swell

9. Hypopharynx
   a) Posterior Tongue
   b) Epiglottis
      (1) Vallecula - "Pocket" formed by the base of the tongue and epiglottis.

10. Larynx
    a) Attached to Hyoid Bone
       (1) "Horseshoe" shaped bone between the chin and Mandibular Angle
       (2) Supports Trachea
    b) Made of Cartilage
       (1) Thyroid Cartilage
          (a) First Tracheal Cartilage
              (i) "Shield Shaped"
                 (a) Cartilage Anterior
                 (b) Smooth Muscle Posterior
              (ii) Laryngeal Prominence
                 (a) "Adam's Apple" anterior prominence of Thyroid Cartilage
                 (b) Glottic opening directly behind
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(2) Glottic Opening
   (a) Patency heavily dependent on muscle tone
   (b) Contain Vocal Bands
      (i) White bands of cartilage produce voice
      (ii) Arytenoid Cartilage
         (a) "Pyramid Like" Posterior attachment of Vocal Bands. Important landmark for Endotracheal intubation Advanced airway
         (iii) Pyriform Fossae: "Hollow Pockets" along the lateral borders of the Larynx

(3) Cricoid Ring
   (a) First Tracheal Ring
   (b) Completely Cartilaginous
   (c) Compression of cricoid ring occludes Esophagus (Sellick Maneuver)

(4) Cricothyroid Membrane
   (a) Fibrous Membrane between Cricoid and Thyroid Cartilage.
   (b) Site for Surgical and Alternative Airway placement

c) Associated Structures
   (1) Thyroid Gland
      (a) Located below Cricoid Cartilage.
      (b) Lies Across Trachea
   (2) Carotid Arteries
      (a) Branches cross and lie closely alongside Trachea.
   (3) Jugular Veins
      (a) Branch across and lie close to Trachea

III. Anatomy of Lower Airway
   A. Function of the lower airway
      1. Exchange of O₂ and CO₂
   B. Location of the lower airway
      1. From Fourth Cervical Vertebrae to Xyphoid Process
      2. From Glottic Opening to Pulmonary Capillary Membrane
   C. Structures of the lower airway
      1. Trachea
         a) Trachea Bifurcates at Carina into:
            (1) Right and left main stem bronchi
            (2) Right main stem has lesser Angle
            (3) Foreign bodies, ET TubeAdvanced airways commonly displace here
            (4) Lined with
               (a) Mucous Cells
               (b) Beta 2 Cells
                  (i) Dilate Bronchioles
b) Main stem Bronchi enter Lungs at Hilum
   (1) Branch into narrowing:
      (a) Secondary and Tertiary Bronchi which branch into:
         (i) Bronchioles
            (a) Branch into Alveolar Ducts which end at Alveolar Sacs

c) Alveoli
   (1) "Balloon like clusters"
   (2) Site of Gas Exchange
   (3) Lined with Surfactant
      (a) Decreases Surface Tension of Alveoli which facilitates ease of expansion
      (b) Alveoli become thinner as they expand which makes diffusion of O\textsubscript{2}/CO\textsubscript{2} Easier
      (c) If Surfactant is decreased or Alveoli are not inflated, Alveoli collapse (Atelectasis)

2. Lungs
   a) Right lung
      (1) 3 Lobes
   b) Left lung
      (1) 2 Lobes
   c) Lobes made of Parenchymal Tissue
   d) Membranous outer lining called Pleura
   e) Lung capacity
      (1) Total Lung Volume
         (a) Adult male, 6 liters
      (2) Not all inspired air enters Alveoli
      (3) Minor diffusion of O\textsubscript{2} takes place in Alveolar ducts and Terminal Bronchioles
   f) Tidal volume
      (1) Volume of gas inhaled or exhaled during a single respiratory cycle
         (a) 5-7 cc/kg (500 cc normally)
   g) Dead space air
      (1) Air remaining in air passageways, unavailable for gas exchange (Approximately 150 cc)
         (a) Anatomic Dead Space
            (i) Trachea
            (ii) Bronchi
         (b) Physiologic Dead Space
            (i) Dead space formed by factors like disease or obstruction
               (a) COPD
               (b) Atelectasis
h) Minute volume
   (1) Amount of gas moved in and out of the respiratory tract per minute
   (2) Determined by:
   (a) Tidal Vol. - Dead Space Volume x Respiratory Rate
i) Functional Reserve Capacity
   (1) After Optimal inspiration, the optimum amount of air that can be forced from the lungs in a single forced exhalation
j) Residual Volume (DEFINE)

3. Alveolar air
   a) Air reaching the alveoli for gas exchange (Alveolar Volume)
   b) Approximately 350 cc

4. Inspiratory reserve (DEFINE)

5. Expiratory reserve (DEFINE)

IV. Mechanics of Respiration
A. Respiration
   1. Definition:
      a) Exchange of gases between a living organism and its environment
      b) Primary Control From the Medulla and Pons
   2. Types
      a) External Respiration: Exchange of gases between the Lungs and the Blood Cells
      b) Internal Respiration: Exchange of gases between the Blood Cells and Tissues
      c) Pulmonary Ventilation: Movement of air into and out of the lungs
   3. Phases
      a) Inspiratory/ Expiratory
         (1) Inspiration
         (a) Stimulus to breath from Respiratory Center
         (b) Impulse Transmitted to Diaphragm via Phrenic Nerve
         (i) Diaphragm: "Muscle of Respiration". Separates Thoracic from Abdominal Cavity
         (c) Diaphragm contracts "flattens"
         (i) Causes Intrapulmonary Pressure to fall slightly below Atmospheric Pressure
         (d) Intercostal Muscles Contract
         (e) Ribs elevate and expand
         (f) Air is drawn into lungs like a vacuum
         (g) Alveoli Inflate
         (h) O₂/CO₂ Diffuse across membrane
      b) Expiration
         (1) Stretch Receptors in Lungs signal Respiratory Center via Vagus Nerve to inhibit inspiration (Hering-Breuer Reflex)
         (2) Natural elasticity (recoil) of the lungs passively expires air
4. Regulation of Respiration
   a) Influenced by
      (1) Chemical Stimuli
          (a) Receptors for O$_2$/CO$_2$ Balance
              (i) Cerebrospinal Fluid pH
              (ii) Carotid Bodies (Sinus)
              (iii) Aortic Arch
          (b) Hypoxic Drive
              (i) Respiratory Stimulus dependent on O$_2$ rather than CO$_2$
                  concentration in the blood. Normally, it's the other way around.
      (2) CNS Regulation and Nerve Receptors
          (a) Medulla
              (i) Primary Involuntary Respiratory Center
                  (a) Connected to Respiratory muscles by Vagus Nerve
          (b) Pons
              (i) Apneustic Center
                  (a) Secondary Control Center if Medulla fails to initiate
                      Respiration
              (ii) Pneumotaxic Center
                  (a) Controls Expiration
      (3) Muscle Movement
          (a) Connected to Respiratory Center by Vagus Nerve

V. The Measurement of Gases
   A. Total pressure
      1. The combined pressure of all Atmospheric gasses
         a) 100% or 760 TORR at Sea Level
   B. Partial pressure
      1. The pressure exerted by a specific atmospheric gas
   C. Concentration of gases in the atmosphere
      1. Nitrogen 78.62%
      2. Oxygen 20.84%
      3. CO$_2$ 0.04%
      4. Water 0.50%
   D. Water vapor pressure
   E. Alveolar Gas concentration
      1. Nitrogen 74.9%
      2. Oxygen 13.7%
      3. CO$_2$ 5.2%
      4. Water 6.2%
VI. Exchange and Transport of Gases in the Body

A. Diffusion
1. Diffusion of gases
   a) \(O_2/CO_2\) dissolve in Water and pass through Alveolar Membrane by Diffusion
      (1) Diffusion: Passage of Solution from area of Higher concentration to Lower concentration

B. Oxygen Content of Blood
1. Dissolved \(O_2\) Crosses Pulmonary Capillary membrane and binds to Hemoglobin (Hgb) of red blood cell
2. Oxygen is carried on Hemoglobin molecule as well as dissolved in Plasma
3. Approximately 97% of total \(O_2\) is bound to Hemoglobin
4. Excess oxygenation may be harmful due to hyperoxemia. Saturation maintained between 92-94% is most appropriate.
4.5. \(O_2\) Saturation:
   a) Compares Available \(O_2\) (the \(O_2\) dissolved in Plasma) to \(O_2\) carrying Capacity of blood

C. Carbon Dioxide Content of the Blood
1. \(CO_2\) is a byproduct of cellular work (Cellular Respiration)
2. \(CO_2\) is transported in blood as Bicarbonate ion
   a) About 33% is bound to Hemoglobin
3. As \(O_2\) Crosses into blood, \(CO_2\) diffuses into Alveoli

D. Inadequate Ventilation
1. Occurs when body cannot compensate for increased \(O_2\) demand or maintain \(O_2/CO_2\) balance
2. Many Causes
   a) Infection
   b) Trauma
   c) Brain stem Insult
   d) Noxious or Hypoxic Atmosphere
   e) Renal Failure
3. Multiple Symptoms
   a) Altered Response
   b) Respiratory Rate Changes (Up or Down)
   c) Respiratory Pattern Changes
      (1) Cheyne-Stokes
         (a) Gradually Increasing Rate and Tidal Volume followed by gradual decrease.
         (b) Associated with Brain Stem Insult
      (2) Kussmull's
         (a) Deep, gasping respirations
         (b) Common in Diabetic Coma
         (c) Increased Intracranial Pressure
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(3) Central Neurogenic Hyperventilation
   (a) Deep Rapid Respiration similar to Kussmaul's
   (b) Increased Intracranial Pressure

4. Common Endpoints
   a) Tissue / Brain ischemia, injury, and death

E. Control of Respiration by Other Factors

1. Body temperature
   a) Respiration increase with Fever
      (1) Response to Metabolic changes due to infection
   b) Drug and medications
      (1) May Increase or Decrease Respiration depending on their physiologic action
   c) Pain
      (1) Increases Respiration
   d) Emotion
      (1) Increases Respiration
   e) Hypoxia
      (1) Increases Respiration
   f) Acidosis
      (1) Respiration Increase as compensatory response to increased CO₂ production
   g) Sleep
      (1) Respiration decrease

2. Modified Forms of Respiration
   a) Protective Reflexes
      (1) Cough
         (a) Forceful, Spastic Exhalation aids in clearing bronchi and bronchioles
      (2) Sneeze
         (a) Clears Nasopharynx
      (3) Gag Reflex
         (a) Spastic Pharyngeal and Esophageal reflex from stimulus of the posterior pharynx
   b) Sighing
      (1) Involuntary deep breath that increases opening of Alveoli
      (2) Normally sigh about once per minute
   c) Hiccough
      (1) Spasm of Diaphragm from Vagal Stimulus
VII. Pathophysiology

A. Obstruction

1. Tongue
   a) Most common Airway Obstruction
   b) Snoring respirations
   c) Corrected with positioning

2. Foreign body
   a) May cause partial or full obstruction
   b) Symptoms include
      1) Choking
      2) Gagging
      3) Stridor
      4) Dyspnea
      5) Aphonia (Unable to Speak)
      6) Dysphonia (Difficulty Speaking)

3. Laryngeal spasm
   a) Spasmotic closure of Vocal Cords
   b) Glottic opening becomes extremely narrow or totally obstructed
   c) Most frequently caused by
      1) Epiglottitis (A Bacterial infection of the epiglottis)
      2) Anaphylaxis (Severe Allergic Reaction)
      3) Trauma from over aggressive technique during Intubation Advanced airway
      4) Immediately upon Extubation especially when patient is semiconscious
   d) Relieved by
      1) Aggressive Ventilation
      2) Forceful upward pull of the Jaw
      3) Muscle Relaxants, IV

4. Fractured larynx
   a) Airway Patency dependent upon muscle tone
   b) Fractured Laryngeal Tissue
      1) Increases Airway Resistance by decreasing Airway size through
         a) Decreasing Muscle Tone
         b) Laryngeal Edema
         c) Ventilatory Effort

5. Aspiration
   a) Significantly increases Mortality
      1) Obstructs Airway
      2) Destroys Delicate Bronchiolar Tissue
      3) Introduces Pathogens
      4) Decrease ability to Ventilate
VIII. Airway Evaluation

A. Essential Parameters
   1. Rate
      a) Normal Resting Rate in Adults: 12-24
   2. Regularity
      a) Steady Pattern
         (1) Irregular respiratory patterns are significant until proven otherwise
   3. Effort
      a) Breathing at rest should be effortless
      b) Effort changes may be subtle in Rate or Regularity
      c) Patients often compensate by preferential positioning
         (1) Upright Sniffing
         (2) Semi-Fowler's
         (3) Frequently avoid Supine

B. Recognition of airway problems
   1. Difficulty in Rate, Regularity, or Effort is defined: Dyspnea
   2. Dyspnea may be result of or result in Hypoxia
      a) Hypoxia: Lack of Oxygen
      b) Hypoxemia: Lack of Oxygen to Tissues
      c) Anoxia: Total absence of Oxygen
   3. Recognition and treatment of Dyspnea is crucial to patient survival
      a) Expert Assessment and Management is essential
         (1) The brain can survive only a few minutes of anoxia
         (2) All therapies fail if Airway is inadequate
   4. Visual Signs and Symptoms
      a) Position: i.e., "tripod", upright with dangling feet
      b) Anxiety
         (1) Range from mild to extreme
      c) Rise and fall of chest
         (1) Normal, Deep, Shallow, Absent
      d) Color of skin
      e) Flaring of nares
      f) Gasping
      g) Pursued lips
      h) Retractions: "Pulling in of skin" between thoracic skeleton during inspiration
         (1) Intercostal
         (2) Suprasternal notch
         (3) Supraclavicular fossa
         (4) Subcostal
   5. Auscultation Techniques
      a) Air movement at mouth and nose
      b) Bilateral lung fields Equal
6. Palpation Techniques
   a) Air movement at mouth and nose
   b) Chest wall
      (1) Paradoxical Motion
      (2) Retractions

7. Bag Valve Mask
   a) Resistance or changing compliance with Bag-Valve-Mask ventilations

8. History
   a) Evolution
      (1) Sudden, gradual over "x" time
      (2) Known cause or "Trigger"
   b) Duration
      (1) Constant, Recurrent
   c) Ease
      (1) What makes it better?
   d) Exacerbate
      (1) What makes it worse?
   e) Associate
      (1) Other Symptoms (Productive cough, Chest Pain, Fever, etc.)
   f) Interventions
      (1) Evaluations/Admissions to Hospital
      (2) Medications (include compliance)
      (3) Ever Intubated

C. Quantitative measurement of patient oxygenation and end-tidal CO₂

1. Oxygen Therapy
   a) Oxygen therapy is used to treat hypoxemia.
   b) Oxygen saturation (SaO₂,SpO₂) readings can help determine which oxygen adjunct should be placed on the patient and the liter flow to be administered.
      (1) A SaO₂,SpO₂ in the range of 95% to 99% is ideal and no supplemental oxygen is needed unless the patient’s chief complaint or injury mechanism warrants.
      (2) An SaO₂,SpO₂ of 91% to 94% represents mild hypoxemia and indicates that the airway should be checked and oxygen therapy started a 4 to 6L via nasal cannula.
      (3) An SaO₂,SpO₂ of 85% to 90% represents moderate hypoxemia. The airway must be checked and aggressive oxygen therapy started at 15L/min via nonrebreather mask.
      (4) An SaO₂,SpO₂ reading of less than 85% indicates severe hypoxemia. In these cases, the EMS provider should prepare to intubate or assist ventilations with a bag-valve-mask and 100% oxygen.
2. Pulse oximetry
   a) Pulse oximetry is a simple, noninvasive procedure used to determine the effectiveness of patient oxygenation.
      (1) Oxygen bound vs unbound Hemoglobin in the red blood cell absorbs infrared light at different rates.
      (2) Pulse Oximeters emit an infrared beam that passes through the capillary bed. The absorption of Infrared light by Hemoglobin is measured in % as Infrared light passes from one end of the probe to the other
      (3) Normal Pulse Ox values are between 94 to 100% on room air. Values below 93 to 94% are abnormal and may suggest acute or chronic hypoxia, i.e., COPD
   b) It allows for continuous monitoring, detecting trends in patient’s oxygenation status within 6 seconds.
   c) Pulse oximetry can:
      (1) Reaffirm perceived hypoxia
      (2) Reveal hidden hypoxia
      (3) Assist in determining what oxygenation adjunct should be applied and liter flow to be administered
      (4) Aid in monitoring clinical improvement of deterioration in acutely dyspneic patients
      (5) Identify when to intubate insert an advanced airway
      (6) Identify changes during intubation advanced airway placement or other airway manipulations
   d) Pulse oximetry should be taken on all patients and recorded as part of their vital signs, because normal evaluation of oxygenation is notoriously unreliable.
   e) Saturation readings should be taken before and after oxygen is administered to any patient.
   f) It is important to keep a patient’s oxygen saturation in a normal range, because declines in saturation result in a reduction in oxygen content.
      (1) With 90% saturation, PO₂ drops to 60 mm Hg.
      (2) With 75% saturation, PO₂ drops to 40 mm Hg.
      (3) With 50% saturation, PO₂ drops to 27 mm Hg.
   g) In addition to oxygen saturation (SaO₂ or SpO₂), a visual pulse rate is displayed (and is audible). However, this unit should not be used in place of the cardiac monitor when the situation dictates the use of one.
   h) Procedure
      (1) Prior to use, the EMS provider should test the unit on themselves to confirm that it is in good operating condition.
      (2) To do this, the EMS provider should turn on the unit and follow all operating recommendations set forth by the manufacturer.
      (3) After it is found that the unit is in good operating condition, the EMS provider should place the finger clip on the patient’s index finger with the outline of the finger facing up.
(4) All dirt and nail polish or any obstructive covering should be removed to prevent the unit from giving a false reading.

(5) When these steps are completed, the unit will show a red number on the left, which is the \( \text{SaO}_2 \) or SpO2, and a red light on the right showing the patient’s heart rate.

(6) The EMS Provider should consider pulse oximetry as only another tool to assist in patient monitoring.

(7) A variety of circumstances produce false readings, including:
   a) Patients who smoked prior to pulse Ox.
   b) COPD patients
   c) Carbon monoxide
   d) Excessive ambient light on the sensor probe
   e) Patient movement
   f) Hypotension (low flow states)
   g) Hypothermia
   h) Use of vasoconstrictive drugs by the patient
   i) Nail polish
   j) Jaundice

3. End Tidal Carbon Dioxide (CO2) Detectors
   a) End-tidal carbon dioxide detectors are an effective way of verifying correct airway device placement.
   b) End-tidal air, which closely correlates with the percentages of gases found in mixed venous blood, contains approximately 6% carbon dioxide.
   c) A lack of carbon dioxide in the end-tidal air strongly suggests the advanced airway has been misplaced into the esophagus.
   d) The devices detect the amount of CO2 in the patient’s expired air.
      1) CO2 is a by-product of cellular metabolism.
      2) CO2 is carried to lungs and is expired
      3) Patient’s expired air passes through a measurement device.
   e) There are two types of end-tidal CO2 detectors currently available.
      1) Disposable colormetric device (least expensive)
         a) Designed for single patient use
         b) Contains a non-toxic chemical indicator that reacts instantly to expired tracheal carbon dioxide by changing color.
         c) The reversibility of this color change allows the EMS provider to determine esophageal or tracheal ventilation (after the required 6 breaths).
         d) The presence of a yellow color on expiration indicates correct ventilation into the trachea.
         e) The presence of a purple color indicates improper ventilation into the esophagus.
         f) The color varies from expiration to inspiration as carbon dioxide leaves rise and fall in a phasic manner
(2) **Electric monitor In line (most qualitative expensive)**
   (a) Portable or hand-held device that uses an infrared analyzer to measure the percentage of carbon dioxide gas at each phase of respiration.
      (i) Information is displayed on a digital readout or printout.
      (ii) Can provide verification of correct placement of an airway device, including supraglottic devices.
      (iii) Can provide continuous carbon dioxide monitoring with a cannula during transport.
   (b) Newer models combine pulse oximetry, pulse rate, and respiratory rate in one unit.

f) These devices are attached in-line between the airway device and the ventilatory device after tube advanced airway placement.

f) Mainly used for confirming advanced Tube airway placement but other applications such as predicting Cardiac Arrest Outcome as well as detecting improvement or deterioration during prehospital care has been suggested.

h) Because of the potential for inaccurate readings in some conditions, the end-tidal carbon dioxide detector should be used as just one of the many tools the EMS provider has available to assess correct placement of airway devices and ventilatory status.

(1) **End-tidal carbon dioxide detectors weakness/limitations**
   (a) Carbon dioxide sometimes inadvertently enters the stomach - Six breaths can quickly wash out any retained carbon dioxide.
   (b) Adequate circulation and pulmonary perfusion are required to obtain diffusion of carbon dioxide from the pulmonary capillary bed.
      (i) Initial end-tidal carbon dioxide levels may be considerably lower during cardiac arrest.
   (c) With adequate CPR, these levels should rise enough to allow the end-tidal carbon dioxide detector to verify proper placement of the airway device.
   (d) Does not conclusively confirm proper Tube advanced airway placement.
      (i) Confirms tube advanced airway is in an area that contains CO₂ such as the hypopharynx.
      (ii) Cannot detect main stem placement or displacement.

IX. **Universal Precautions and Body Substance Isolation (BSI): Standard precautions** in airway management

X. **Airway Management**
   A. **Noninvasive Maneuvers**
      1. **Opening the mouth**
         a) Head-tilt/chin-lift maneuver
            (1) Most basic airway maneuver
               (a) Tilt head back
               (b) Lift chin forward
(c) Open mouth
(2) Indications
   (a) Unresponsive patients who:
      (i) Do not have mechanism for C-Spine injury
      (ii) Unable to protect their own Airway

(3) Contraindications
   (a) Awake patients
   (b) Possible C-Spine Injury

(4) Advantages
   (a) No equipment required
   (b) Simple
   (c) Safe
   (d) Non-invasive

(5) Disadvantages
   (a) Head tilt hazardous to C-Spine Injury patients
   (b) Does not protect from Aspirate

b) Jaw-thrust maneuver lift
(1) Head is maintained Neutral
   (a) Jaw is displaced forward
      (i) Lift by grasping under chin and behind teeth
   (b) Mouth opened

(2) Indications:
   (a) Patients who:
      (i) Unresponsive
      (ii) Unable to protect their own Airway
      (iii) May have C-Spine Injury

(3) Contraindications
   (a) Responsive Patients
   (b) Resistance to opening mouth

(4) Advantages
   (a) May be used in C-Spine injury
   (b) May be performed with Cervical Collar in place
   (c) Does not require special equipment

(5) Disadvantages
   (a) Cannot maintain if pt becomes responsive or combative
   (b) Difficult to maintain for extended period
   (c) Very difficult to use in conjunction with Bag Valve Mask Ventilation
   (d) Thumb must remain in patient's mouth in order to maintain displacement
   (e) Separate rescuer required to perform Bag Valve Mask Ventilation
   (f) Does not protect against aspiration
c) Modified Jaw-Thrust Maneuver
   (1) Head maintained Neutral
       (a) Jaw is displaced forward at Mandibular Angle
   (2) Indications
       (a) Unresponsive
       (b) Cervical Spine Injury
       (c) Unable to protect own airway
       (d) Resistance to opening mouth
   (3) Contraindications
       (a) Awake Patients
   (4) Advantages
       (a) Non-invasive
       (b) Requires no special equipment
       (c) May be used with Cervical Collar in place
   (5) Disadvantages
       (a) Difficult to maintain
       (b) Requires Second Rescuer for Bag Valve Mask Ventilation
       (c) Does not protect against aspirate
       (d) Cricoid pressure

B. Suctioning
   1. Types of suctioning equipment
      a) Hand-powered suction devices
         (1) Advantages
            (a) Lightweight
            (b) Portable
            (c) Mechanically Simple
            (d) Inexpensive
         (2) Disadvantages
            (a) Limited Volume
            (b) Manually Powered
            (c) Fluid contact components not disposable
      b) Oxygen-powered portable suction devices
      c) Battery-operated portable suction devices
         (1) Advantages
            (a) Lightweight
            (b) Portable
            (c) Excellent Suction power
            (d) May “Field Strip” Troubleshoot most components
         (2) Disadvantages
            (a) More complicated mechanics
            (b) May lose battery integrity over time
            (c) Some fluid contact components not disposable
d) Mounted vacuum-powered suction devices
   (1) Advantages
      (a) Extremely strong vacuum
      (b) Adjustable Vacuum power
      (c) Fluid contact components disposable
   (2) Disadvantages
      (a) Non-portable
      (b) Cannot "Field Service" or substitute power source

2. Types of suctioning catheters
   a) Hard or rigid catheters
      (1) AKA: "Yankauer" or "Tonsil Tip"
      (2) Suction large volumes of fluid rapidly
      (3) Standard Size
   b) Soft catheters
      (1) Can be placed in Oropharynx, Nasopharynx, or down Endotracheal Tube advanced airways
      (2) Various Sizes
      (3) Smaller inside diameter than hard tip catheters

3. Suctioning the upper airway
   a) Prevention of aspirate critical
      (1) Mortality increases significantly if aspiration occurs
      (2) Pre-oxygenate if possible
      (3) Hyperoxygenate after
   b) Description:
      (1) Soft Tip Catheters must be pre-lubricated
      (2) Place Catheter
      (3) Suction during extraction of catheter
      (4) Do not exceed 15 seconds
      (5) Hyperoxygenate

4. Suctioning trachea when using selected Multi-Lumen Airways
   a) Pre-oxygenation Essential
   b) Description:
      (1) Pre-lubricate Soft Tip Catheter
      (2) Hyperoxygenate
         (a) May be necessary to inject 3 to 5 cc's of Sterile Water down airway tube advanced airway to loosen secretions
      (3) Gently insert catheter until resistance is felt
      (4) Suction upon extraction of catheter
      (5) Do not exceed 15 seconds
      (6) Hyperoxygenate
C. Gastric Distention
   1. Air becomes trapped in the stomach
      a) Very common when ventilating non-intubated patients
         (1) Stomach diameter increases
         (2) Pushes against diaphragm
         (3) Interferes with lung expansion
            (a) Abdomen becomes increasingly distended
            (b) Resistance to Bag Valve Mask Ventilation
   2. Management
      a) May be reduced by increasing Bag Valve Mask Ventilation time
         (1) Adults: 1.5-2 seconds
         (2) Peds: 1-1.5 seconds
      b) Prepare for large volume suction
      c) Position Patient Left Lateral
      d) Slowly apply pressure to epigastric region
      e) Suction as necessary - NG or OG tube placement and suctioning is not in an EMT’s scope of practice.

D. Basic Airway Management
1. Nasal airway
   a) Soft rubber with beveled tip
      (1) Distal tip rests in hypopharynx
      (2) For adults, length measured from nostril to earlobe
      (3) Diameter roughly equal to patient’s little finger
   b) Indications
      (1) Unconscious patients
      (2) Altered Response patients with suppressed gag reflex
   c) Contraindications
      (1) Patient intolerance
      (2) Caution in presence of facial fracture or Skull fracture
   d) Advantages
      (1) Can be suctioned through
      (2) Provides patent airway
      (3) Can be tolerated by awake patients
      (4) Can be safely placed “blindly”
      (5) Does not require mouth to be open
   e) Disadvantages
      (1) Poor technique may result in severe bleeding
         (a) Resulting epistaxis may be extremely difficult to control
      (2) Does not protect from aspirate
f) Placement
   (1) Determine correct length and diameter
   (2) Lubricate Nasal Airway
   (3) With bevel towards Septum, insert gently along the nasal floor parallel to the mouth
   (4) Do Not Force
      (a) Measurement from corner of the mouth to the Jaw Angle rather than tip of the ear.
      (i) Too long airway causes Airway Obstruction

2. Oral airway
   a) Hard plastic airway designed to prevent the tongue from obstructing glottis
      (1) Indications
         (a) Unconscious Patients
         (b) Absent Gag Reflex
      (2) Contraindications
         (a) Conscious Patients
      (3) Advantages
         (a) Non-invasive
         (b) Easily placed
         (c) Prevents blockage of glottis by tongue
      (4) Disadvantages
         (a) Does not prevent aspiration
         (b) Unexpected gag may produce vomiting
      (5) Complications
         (a) Unexpected gag may produce vomiting
         (b) Pharyngeal or Dental Trauma with poor technique
      (6) Placement
         (a) Open mouth
         (b) Remove visible obstructions
         (c) Place with distal tip toward glottis using tongue depressor as adjunct
         (d) Alternate: Place airway with distal tip toward palate. Rotate into place

E. Methods to perform ventilation
1. One person bag-valve-mask
   a) Fixed Volume self inflating bag can deliver adequate Tidal Volumes and O₂ enrichment
      (1) Indications
         (a) Apnea from any mechanism
         (b) Unsatisfactory Respiratory effort
      (2) Contraindications
         (a) Awake, intolerant patients
      (3) Advantages
(a) Excellent Blood/Body Fluid barrier
(b) Good Tidal Volumes
(c) Oxygen Enrichment
(d) Rescuer can ventilate for extended periods without fatigue

(4) Disadvantages
(a) Difficult Skill to master
(b) Mask seal may be difficult to obtain and maintain
(c) Tidal Volume delivered is dependent on mask seal integrity

(5) Complications
(a) Inadequate Tidal Volume Delivery with:
   (i) Poor technique
   (ii) Poor mask seal

(6) Method for use
(a) Position appropriately
(b) Choose proper mask size
   (i) Seats from bridge of nose to chin
(c) Position, Spread/Mold/Seal mask
(d) Hold mask in place
(e) Squeeze Bag completely over 1.5 to 2 seconds for Adults
(f) Avoid overinflation
(g) Re-inflate completely over several seconds

(7) Special considerations
(a) Medical
   (i) Observe for:
      (a) Gastric Distension
      (b) Changes in compliance of bag with ventilation
      (c) Improvement or deterioration of ventilation status (i.e., Color change, Responsiveness, Air Leak around Mask

(b) Trauma
   (i) Very difficult to perform with Cervical Spine Immobilization in place

(c) Pediatrics
   (i) Flat Nasal Bridge makes achieving mask seal more difficult
   (ii) Compressing mask against face to improve Mask seal results in obstruction
   (iii) Mask seal best achieved with Jaw displacement

2. Two person bag-value-mask
   a) Alternate Bag Valve Mask Ventilation Method
   b) Most efficient method
      (1) Indications
         (a) Bag Valve Mask Ventilation on any patient
            (i) Especially useful for Cervical Spine immobilized patients
            (ii) Difficulty obtaining or maintaining adequate mask seal
(2) Contraindications
   (a) Awake, intolerant patients

(3) Advantages
   (a) Superior Mask Seal
   (b) Superior Volume Delivery

(4) Disadvantages
   (a) Requires extra personnel

(5) Complications
   (a) Hyperinflation of patient's Lungs
   (b) Gastric Distension

(6) Method for use
   (a) First Rescuer maintains mask seal by appropriate method
   (b) Second Rescuer Squeezes Bag

(7) Special Considerations
   (a) Observe Chest Movement
   (b) Avoid overinflation
   (c) Monitor Lung Compliance with Ventilations

3. Flow-restricted oxygen powered ventilation devices
   a) Demand Valve
      (1) Trigger when patient inhales. Delivers O\textsubscript{2} as long as inspiratory strength is enough to "hold the gate open"

4. Automatic transport ventilators
   a) Volume/Rate controlled
   b) Indications
      (1) Extended ventilation of intubated patients with an advanced airway
   c) Contraindications
      (1) Awake patients
      (2) Obstructed Airway
      (3) Increased Airway Resistance
         (a) Pneumothorax
         (b) Asthma
         (c) Pulmonary Edema
   d) Advantages
      (a) Lightweight
      (b) Portable
      (c) Durable
      (d) Mechanically Simple
      (e) Adjustable Tidal Volume
      (f) Adjustable Rate
      (g) Adapts to portable O\textsubscript{2} Tank
Supraglottic Airway: Special Training - Draft 2 - Revised 3/11

(5) Disadvantages
(a) Cannot detect tube advanced airway displacement
(b) Does not detect increasing airway resistance
(c) Difficult to secure
(d) Dependent on O₂ Tank Pressure

F. Oxygen delivery
1. Enriched O₂ Atmosphere increases Oxygen to cells
   a) Increasing available O₂ increases Patient's ability to compensate
2. O₂ delivery method must be reassessed to determine adequacy and efficiency

G. Advanced Airway Management - Multi-lumen airways Supraglottic Airways
(Supraglottic airways are primarily designed to enter the oropharyngeal space, above the glottis. Airways designed for Tracheal intubation advanced airway are for ALS use only. Supraglottic airways may be used as an adjunct for tracheal intubation advanced airway by paramedics ALS personnel.)

G. Please note there are additional SGAs on the market, to include: EOA, King LT, iGel, air-Q, SALT, and LMA
1. Pharyngo-tracheal lumen airway (PTL) Although the PTL is still in the ILS protocols, it is rarely used.
   a) A two tube advanced airway, two cuff system
      (1) The first tube advanced airway is a short, wide tube advanced airway with a large cuff along its lower portion
         (a) When inflated, this cuff seals off the oropharynx and air is introduced through the tube advanced airway as its proximal end enters the pharynx
      (2) A second, longer tube advanced airway travels through the first, extending past its distal end
         (a) Because of its longer length, it can be passed into either the trachea or the esophagus
         (b) At the distal end of the longer tube advanced airway is a cuff that, when inflated, seals off whichever anatomic structure it is in
         (c) When the longer tube advanced airway is in the esophagus, the device acts like an EOA and the patient is ventilated through the first tube advanced airway
         (d) When the longer tube advanced airway is in the trachea, the device acts like an endotracheal tube advanced airway and the patient is ventilated through it
   b) Designed to be passed blindly
   c) Multiple ventilation ports provide means to ventilate regardless of whether the long tube advanced airway is placed in the Esophagus or the Trachea
   d) Indications
      (1) Pulseless, apneic patient (no spontaneous respirations)
      (2) Patients that are apneic and can tolerate an oropharyngeal airway
      (3) Alternative Airway control when conventional intubation advanced airway procedures are not available or successful
e) Contraindications
   (1) Age and weight restrictions not consistent with manufacturer’s recommendations
   (2) Conscious patient with a gag
   (3) Esophageal Trauma or disease
   (4) Caustic ingestion
f) Advantages
   (1) Can ventilate with Tracheal or Esophageal Placement
   (2) No face mask to seal
   (3) No Special Equipment
   (4) Does not require Sniffing Position
g) Disadvantages
   (1) Cannot be used in Awake patients
   (2) Adults only
   (3) Unconscious Only
   (4) Short tube advanced airway (Pharyngeal) tube advanced airway balloon cuff mitigates but does not eliminate aspiration risk
   (5) Can only be passed orally
   (6) Extremely difficult to Intubate around
h) Method
   (1) Head Neutral
   (2) Pre-Intubation Advanced airway Precautions
   (3) Insert at the midline using Jaw-Lift
   (4) Ventilate through short tube advanced airway (green) first
      (a) Chest rise indicates long tube advanced airway is in esophagus
      (b) Inflate short tube advanced airway balloon cuff and Ventilate
      (c) No chest rise indicates long tube advanced airway in Trachea
      (d) Inflate long tube advanced airway balloon cuff
      (e) Ventilate through long tube advanced airway
i) Complications
   (1) Pharyngeal or Esophageal Trauma from poor technique
   (2) Unrecognized displacement of long tube advanced airway into esophagus
   (3) Displacement of short (Pharyngeal) tube advanced airway balloon cuff

2. Combi tube airway
   a) A double lumen tube advanced airway with two balloon cuffs
   b) Indications
      (1) Alternative Airway control when conventional Intubation Advanced airway measures are unsuccessful or unavailable
   c) Contraindications
      (1) Age and weight restrictions not consistent with manufacturer’s recommendations
      (2) Conscious patient with a gag
(3) Esophageal Trauma or disease
(4) Caustic ingestion
d) Advantages
(1) Rapid Insertion
(2) No Special Equipment
(3) Does not require Sniffing Position
e) Disadvantages
(1) Impossible to suction Trachea when LUd advanced airway is in Esophagus
(2) Adults Only
(3) Unconscious Only
(4) Very difficult to Intubate around
f) Method
(1) Head Neutral
(2) Preintubation advanced airway Precautions
(3) Insert with Jaw-Lift at midline
(4) Inflate Pharyngeal Cuff with 100 cc air
(5) Inflate Distal Cuff with 10-15 cc air
(6) Ventilate through longest LUd advanced airway First (Pharyngeal)
   (a) Chest rise indicates esophageal placement of distal tip
   (b) No chest rise indicates Tracheal placement. Switch ports and ventilate

3. Field extubation
   a) The only reason to field extubate is if the patient is unreasonably intolerant of the LUd advanced airway
   b) Ordinarily you do not extubate for these reasons:
      (1) Awake patients are, in particular, at highest risk of laryngospasm immediately following extubation.
      (2) The possibility of airway occlusion due to emesis
      (3) Difficulty of reintroducing the airway due to laryngospasm

H. Special patient considerations
1. Patients with a laryngectomy (stoma)
   a) Laryngectomy Patients have a permanent or semi-permanent surgical opening below the glottis, which acts as their primary airway. The opening is called a Stoma
   b) Airway is kept open by a short LUd advanced airway device that fits into the Stoma
      (1) Part or entire LUd advanced airway assembly may be removed for normal cleaning
   c) Since protective function of the upper airway is bypassed, laryngectomy patients commonly produce moderately large amounts of mucous. Coughing is also not as efficient or forceful
   d) Most common Laryngectomy problems
(1) Mucous Plug
   (a) Usually occurs while coughing
   (b) Mucous builds up and cannot be forcibly expelled from bronchi or
       TubeAdvanced airway
   (c) Treatment
      (i) Suction Trachea
         (a) Pre-oxygenate
         (b) Inject 1 to 3 cc's Sterile Water into trachea to loosen
             secretions. Patient will cough.
         (c) Gently insert flexible suction catheter into trachea. Suction
             on the way out. Encourage patient to cough
         (d) Oxygenate
         (e) Reassess
         (f) Repeat as necessary

(2) Stenosis
   (a) Stoma narrows and patient cannot replace their TubeAdvanced
       airway
   (b) Particularly dangerous for patients with a recent laryngectomy
   (c) May require placement of smaller Tubeadvanced airway into the
       Stoma to prevent complete occlusion
   (d) If Tubeadvanced airway placement is not immediately successful,
       rapid transport is necessary. Give 100% O2
   e) Dental Appliances - Loose Dentures, Retainers, etc.: Should be removed
      when possible

2. Additional considerations
   a) Pulse oximetry cannot give information about alveolar ventilation. For this
      reason, the EMS provider should be careful not to accept adequate
      SaO2,SpO2 values while neglecting gross hypoventilation.
   b) Patients with chronic obstructive pulmonary disease may have a normally
      low SaO2,SpO2, so adequate histories must be obtained.

XI. Medical/legal considerations
MULTI-LUMEN SUPRAGLOTTIC AIRWAY DEVICE
(COMBITUBE ADVANCED AIRWAY® OR PTL®)

Student: ______________________    Evaluator: ______________________
Date: ______________________    Evaluator Signature: ______________________

NOTE: If student elects to initially ventilate with BVM attached to reservoir and oxygen, full credit must be awarded for steps denoted by "**"

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takes or verbalizes body substance isolation standard precautions precautions</td>
<td>1</td>
</tr>
<tr>
<td>Opens airway manually</td>
<td>1</td>
</tr>
<tr>
<td>Elevates tongue, inserts simple adjunct [oropharyngeal or nasopharyngeal airway]</td>
<td>1</td>
</tr>
<tr>
<td>&quot;**Ventilates patient immediately with BVM device unattached to oxygen</td>
<td>1</td>
</tr>
<tr>
<td>&quot;**Hyperventilates patient with room air</td>
<td>1</td>
</tr>
<tr>
<td>NOTE: Evaluator now informs student no gag reflex is present and patient accepts adjunct</td>
<td>1</td>
</tr>
<tr>
<td>Attaches oxygen reservoir to BVM &amp; connects to high flow oxygen [12-15 liters/min.]</td>
<td>1</td>
</tr>
<tr>
<td>NOTE: After 30 seconds, evaluator auscultates and reports breath sounds are present and equal bilaterally and medical control has ordered insertion of a multi-lumen airway. The evaluator must now take over ventilation.</td>
<td>1</td>
</tr>
<tr>
<td>Directs assistant to hyperventilate patient</td>
<td>1</td>
</tr>
<tr>
<td>Checks/prepares airway device</td>
<td>1</td>
</tr>
<tr>
<td>Lubricates distal tip of the device (may be verbalized)</td>
<td>1</td>
</tr>
<tr>
<td>NOTE: Evaluator to remove OPA and move out of the way when student is prepared to insert device</td>
<td>1</td>
</tr>
<tr>
<td>Positions the head properly</td>
<td>1</td>
</tr>
<tr>
<td>Performs a jaw-thrust maneuver lift</td>
<td>1</td>
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<tr>
<td>COMBITUBE ADVANCED AIRWAY®</td>
<td>USES PTL®</td>
</tr>
<tr>
<td>Inserts device in mid-line and to depth so printed ring is at level of teeth</td>
<td>Inserts device in mid-line until bite block flange is at level of teeth</td>
</tr>
<tr>
<td>Inflates pharyngeal cuff with proper volume and removes syringe</td>
<td>Secures strap</td>
</tr>
<tr>
<td>Inflates distal cuff with proper volume and removes syringe</td>
<td>Blows into advanced airway #1 to adequately inflate both cuffs</td>
</tr>
<tr>
<td>Attaches/directs attachment of BVM to the first (esophageal placement) lumen and ventilates</td>
<td>1</td>
</tr>
<tr>
<td>Confirms placement and ventilation through correct lumen by observing chest rise, auscultation over the epigastrium, and bilaterally over each lung</td>
<td>1</td>
</tr>
<tr>
<td>NOTE: The evaluator states, &quot;You do not see rise and fall of the chest and you only hear sounds over the epigastrium.&quot;</td>
<td>1</td>
</tr>
<tr>
<td>Attaches/directs attachment of BVM to the second (endotracheal placement) lumen and ventilates</td>
<td>1</td>
</tr>
<tr>
<td>Confirms placement and ventilation through correct lumen by observing chest rise, auscultation over the epigastrium, and bilaterally over each lung</td>
<td>1</td>
</tr>
<tr>
<td>NOTE: Evaluator confirms adequate chest rise, absent sounds over the epigastrium, and equal bilateral breath sounds</td>
<td>1</td>
</tr>
<tr>
<td>Secures device or confirms that the device remains properly secured</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>20</td>
</tr>
</tbody>
</table>

Complete Critical Criteria on the reverse side of this form.
CRITICAL CRITERIA

___ Failed to take or verbalize **body substance isolation standard precautions** precautions
___ Failure to initiate ventilations within 30 seconds after taking **body substance isolation standard precautions** precautions or interrupts ventilation for greater than 30 seconds at any time
___ Failure to voice and ultimately provide high oxygen concentrations [at least 85%]
___ Failure to ventilate patient at rate of at least 10/minute
___ Failure to provide adequate volumes per ventilation [maximum 2 errors/minute permissible
___ Failure to hyperventilate patient prior to placement of the multi-lumen airway device
___ Failure to insert the multi-lumen airway at a proper depth or at either proper place within 3 attempts
___ Failure to inflate both cuffs properly
___ **Combitube advanced airway** - Failure to remove the syringe immediately after inflation of each cuff
___ **PTL** - Failure to secure the strap prior to inflation
___ Failure to confirm that the proper lumen of the device is being ventilated by observing chest rise, auscultation over the epigastrium, and bilaterally over each lung
___ Inserts any adjunct in a manner dangerous to patient

NOTE: 20 points possible. 16 points and no checked critical criteria required for successful completion.

You must factually document your rationale for checking any of the above critical items below:

**EVALUATION NOTES**