1 Division 4 Medical Emergencies

2 Chapter 27 Pulmonology

3 Respiratory Physiology
   ● Chest Wall
     – _____________________________
     – Intercostal nerves and vessels
     – Intercostal Muscles
   ● Pleura
     – _____________________________ Pleura: On the lung surface
     – _____________________________ Pleura: Lines the chest wall
   ● Diaphragm

4 Respiratory Physiology

5 Inspiration
   ● Inspiration: The _____________________________ phase of breathing

6Expiration
   ● Expiration: The _____________________________ phase of breathing

7 Regulation of Ventilation
   ● The _____________________________
     – Most protected part of the brain
   ● Stretch Receptors
     – Prevents over expansion of the lungs
   ● Changes in _____________________________ stimulates the respiratory drive

8 Regulation of Ventilation
   ● _____________________________ Drive
     – Normal drive
     – CO₂ levels in the arterial blood is the normal stimulus for respirations
   ● _____________________________ Drive
     – Backup system
     – Common in COPD Patients
     – O₂ levels in the arterial blood is the normal stimulus for respirations

9 Respiratory Physiology
   ● _____________________________: the process by which gases move between the alveoli and the pulmonary capillaries
   ● Factors that can interfere with Diffusion
     – Trauma
     – _____________________________ accumulation in interstitial spaces
     – Thickening of the endothelial lining
   ● Effect of Oxygen Therapy
     – Higher concentration of oxygen _____________________________ diffusion rate
Respiratory Physiology

- Pulmonary Perfusion: circulation of blood through the_______________________________

- Requirements:
  - Adequate_______________________________ volume
  - Intact pulmonary capillaries
  - Efficient pumping action by the_______________________________

- Hemoglobin: must carry adequate oxygen
- Carbon Dioxide

Pathophysiology

Disruption in Ventilation

- Upper & Lower Respiratory Tracts
  -_______________________________ due to trauma or infectious processes

- Chest Wall & Diaphragm
  -_______________________________
  - Pneumothorax
  - Hemothorax
  -_______________________________ chest
  - Neuromuscular disease

Disruption in Ventilation (Cont’d)

- Nervous System
  -_______________________________
  - Poisoning or Overdose
  -_______________________________

Abnormal Breathing Patterns

- Cheyne-Stokes Respirations:
  - Pattern with alternating periods of_______________________________ and tachypnea
  - Seen in elderly patients with terminal disease or in brain injuries

-_______________________________ Respirations:
  - Deep, rapid breaths
  - Caused by severe metabolic and CNS problems
  - Common in_______________________________ ketoacidosis

Abnormal Breathing Patterns

- Central neurogenic_______________________________:
  - Also produces deep, rapid, noisy respirations
  - Caused by strokes or injury to the brainstem

- Ataxic (_______________________________) Respiration:
  - Characterized by repeated episodes of gasping ventilations separated by periods of apnea
  - Seen in patients with increased_______________________________
Abnormal Breathing Patterns

- Respiration:
  - Long, deep breaths that are stopped during the inspiration phase and separated by periods of apnea
  - Result of ___________________________ or severe central nervous system disease

Pathophysiology

- Disruption in Diffusion due to:
  - Hypoxia
  - Damaged ___________________________

- Disruption in Perfusion:
  - Alteration in Blood Flow
  - Changes in ___________________________
  - Pulmonary ___________________________: when an area of lung tissue is appropriately ventilated but no capillary perfusion occurs, available oxygen is not moved into the circulatory system thus unoxygenated blood is returned to the heart

Assessment of the Respiratory System

Scene Size-up:

- Threats to Safety
  - Identify rescue environments having decreased ___________________________ levels.
  - Gases and other chemical or biological agents.

Assessment

Primary Assessment

- General Impression
  - ___________________________
  - ___________________________
  - Mental status
  - Ability to speak
  - Respiratory ___________________________

Assessment

Airway

- Proper ventilation cannot take place without an adequate ___________________________.

- Airway must be open and clear of obstructions
  - Dentures
  - ___________________________
  - Foreign Bodies

Assessment

Breathing:
- Signs of life-threatening problems:
  - Alterations in _____________________________ status
  - Severe central cyanosis, pallor, or diaphoresis
  - Absent or abnormal breath _____________________________
  - Speaking limited to 1–2 words
  - _____________________________
  - Use of accessory muscles or presence of retractions

22  Focused History & Physical Exam
History
  - Paroxysmal nocturnal dyspnea and orthopnea
  - Coughing and hemoptysis
  - Associated chest pain
  - Smoking history or exposure to secondary smoke
  - Similar _____________________________ Episodes

23  Focused History & Physical Exam
Physical Examination:
  - Look for asymmetry, increased diameter, or paradoxical motion.
  - Feel for subcutaneous emphysema or tracheal deviation.
  - With suspected pneumothorax and pulmonary edema

24  Abnormal Breath Sounds
  - Indicates upper airway is partially obstructed.
    - Normally by the tongue
  - Harsh, high-pitched sound heard on inspiration
    - Characteristic of upper airway obstruction such as croup
  - Whistling sound due to narrowing of the airways by edema, bronchoconstriction, or foreign materials

25  Abnormal Breath Sounds
  - Rattling sounds in the larger airways
    - Associated with excessive mucus or other material
  - Fine, moist crackling sound
    - Associated with fluid in the smaller airways
● Pleural _____________________________ Rub
  – Sounds like dried pieces of leather rubbing together
  – Occurs when the pleura becomes inflamed, as in pleurisy

26 Focused History & Physical Exam
Extremities:
● Look for peripheral _____________________________.
● Look for swelling and redness, indicative of a venous clot.
● Look for finger _____________________________, which indicates chronic hypoxia.

27 Examining the Finger Tips

28 Focused History & Physical Exam
● Vital Signs
  – _____________________________
● Blood Pressure
● Respiratory Rate
  – Observe for _____________________________.

29 Focused History & Physical Exam
● Assume that an elevated respiratory rate in a patient with dyspnea is caused by _____________________________.
  A persistently slow rate indicates impending respiratory arrest.

30 Pulse Oximetry
● Measures the oxygen saturation in the _____________________________ beds
● Conditions affecting accuracy
  - _____________________________ temperatures
  -Carbon monoxide in blood
  -Mechanical problems
  -Fingernail _____________________________

31 Capnography
● At the cellular level Oxygen and glucose combine to produce _____________________________ for cells. Carbon Dioxide is created as a waste product and is diffused into the blood and is carried back to the lungs.
● This is known as _____________________________ Cycle

32 Capnography
● Measures the carbon dioxide levels in exhaled air: End Tidal CO2 (__________________________)
● Types
  – Continuous _____________________________
  – _____________________________ devices
  – Electronic sensing devices
● May not be very accurate after prolonged cardiac arrest; especially the colormetrics
● Now part of the primary confirmation process of advanced airways
Capnography

Waveform Capnography
- Highly recommended by the _____________________________ through their ACLS and PALS programs
- Use is rapidly growing in EMS and emergency medicine
- Further uses are expected with more research
- Can be a valuable _____________________________ if used correctly

Waveform Capnography has two components:
1. A _____________________________: Gives a numerical value of the peak ETCO2
2. _____________________________: Shows a visual graph of the patient’s respiration
   - Both components are important, and can aid in treating patients.
     - Think of it as the end tidal number as your heart rate and the waveform as the ECG.

Phases of Waveform Capnography

Phase I (AB)
- Respiratory _____________________________
  - Represents post _____________________________ and dead air exhalation (air that has not reached the alveoli).
  - No CO2 is present

Phase II (BC)
- Respiratory _____________________________ (exhalation upstroke)
  - Air is being exhaled that is rich in _____________________________

Phase III (CD)
- Respiratory _____________________________ (exhalation plateau)
  - The end of phase III is the _____________________________ ETCO2 and is where we get our numerical value

Phase IV (DE)
- _____________________________ Phase (inhalation _____________________________)
  - Represents inhalation

Normal Waveform
- _____________________________ measures CO2 levels
- Horizontal measures _____________________________
- Normal ETCO2 values
  - Between ____________ - ____________ mmHg
  - Normal respiratory rate is ____________ - ____________

Benefits of Waveform Capnography
- Provides a “real time” look at respirations
- Allows for confirmation of an _____________________________ airway
Waveform Capnography and the Patient’s Respirations (1 of 2)

It is a real time look at the pt’s respiratory cycle:

- Waveform capnography shows us a real time waveform of each ____________.
- If a patient were to suddenly become ____________, it could be several minutes before you see any changes in the pt’s O2 sats. With waveform you be able to see it instantly.

Waveform Capnography and the Patient’s Respirations (2 of 2)

- It can help us determine how ____________ and the cause of the patient’s respiratory distress.
- It can also help us determine how ____________ our treatment is for the respiratory distress.

Waveform Capnography as a Confirmation Device for ETT (1 of 2)

- One of the easiest and most accurate ways to verify proper ____________ tube placement.
- ETCO2 is considered the ____________ for confirming ETT placement.
- It provides documented proof that the ET Tube is in the trachea.

Waveform Capnography as a Confirmation Device for ETT (2 of 2)

- It cannot determine if the tube is in the right main stem bronchi. Lung sounds still need to be auscultated.
- It is more ____________ than color metric devices.
  - Able to constantly monitor the waveform.
- Goal is to maintain ETCO2 readings between _______ and _______ mmHg for perfusing patients.

Which Tracing Confirms Proper ETT Placement?

Waveform Capnography and Chest Compressions (1 of 2)

- It can help show effectiveness of chest ____________:
- Circulation is needed for the gas exchange in the lungs.
- Without a pulse, the patient’s ETCO2 are going to ____________.
- During CPR try to keep your ETCO2 levels as ____________ as possible by “Pushing hard and pushing fast” on chest.

Waveform Capnography and Chest Compressions (2 of 2)

- ETCO2 readings of less than _______ mmHg has been shown to have NO chance of ROSC.
- ETCO2 readings should be maintained at or above _______ mmHg at all times during CPR.
- Adjustments of rate, hand position, or ____________ can be made.
to assure proper ETCO2

50 Waveform Capnography and Spontaneous Circulation
- It can help determine ROSC:
  - During CPR if you see a sudden _____________ in your ETCO2 it is a good indication that the pt has ROSC.
- It can help determine the loss of spontaneous circulation.
  - A sudden _________________ in the pt’s ETCO2 can be an indication that the pt has lost pulses.

51 Waveform Capnography and RSI (PAI) (1 of 2)
- Waveform capnography can help detect when a patient is coming out of paralysis or _____________
- By looking at waveform we can see when a pt is starting to _______________ up from PAI and needs to be sedated.

52 Waveform Capnography and RSI (PAI) (2 of 2)
- Will see signs of a pt waking up in the waveform long before other traditional signs such as:
  - Increase _____________ rate
  - _________________
  - “_______________ ” the tube
  - Purposeful movement

53 Sign of Loss of Paralysis/Sedation
- Notice the _________________ at the end of the waveform.
  - Sign that the pt is starting to breath on their own.
- If you notice the notch, this indicates need for additional sedatives/___________ to maintain sedation.

54 Waveform and Hyperventilation
- With hyperventilation, patient is blowing off more _________________.
- ETCO2 values are going to be _______________. Note that the waves start to get smaller and more frequent

55 Waveform and Hypoventilation
- With hypoventilation, the respirations are _________________ and the pt is retaining CO2.
- ETCO2 readings are _________________. Note that the waves are less frequent and starting to get taller

56 Waveform and Apnea
- With ________________, the patient is no longer exhaling CO2
- Waveform with go ________________ and you will not get a numerical reading.

57 Waveform and Bronchoconstriction (Shark Fin)
- During bronchoconstrictions (asthma/COPD) it takes longer for the air to be exhaled and _________________ alveolar emptying. This cause phase II and III to
giving a shark fin appearance.

– The more pronounced the shark fin the more _____________________________ the bronchoconstriction.

58 Waveform and Bronchodilators
● The waveform can also determine how effective _____________________________ are working.

– During and after a breathing treatment, if you notice the waveform start to __________ out and the ETCO2 go back to a normal range it is a sign that patient’s condition is improving.

59 Capnography of Asthma Patient

60 Changing ETCO2 values in Asthma (1 of 2)
Mild Asthma:
● A pt with a mild asthma attack the ETCO2 will begin to drop (<___________) due to the pt hyperventilating to compensate for the respiratory distress.

Moderate Asthma:
● As the respiratory distress starts to get worse the pt’s ETCO2 will begin to _____________________________ to a normal level.

61 Changing ETCO2 values in Asthma (2 of 2)
Severe Asthma:
● As the respiratory distress becomes severe pt’s ETCO2 will _____________________________ to a high number due to fatigue, air trapping, and moving little air.

● ETCO2 may rise to dangerous levels (> _____________)

62 Capnography – Pitfalls
● May provide _____________________________ positives on colormetrics or increased CO2 levels on Waveform

– _____________________________ use

– _____________________________ beverages

● Continues to drop CO2 levels in cardiac arrest

63 Peak Flow
● Small, hand-held device used to determine the patient’s peak expiratory flow rate (PEFR)

● Normal is based on patient’s age, sex, and height

● Obtained by using a Wright _____________________________

● Recorded in _____________________________ per minute

● Pt must forcibly _____________________________

64 Management of Respiratory Disorders
Basic Principles:
● Maintain the airway.

– Protect the c-spine if trauma is suspected.

● Any patient with respiratory distress should receive _____________________________

● Any patient suspected of being hypoxic should receive oxygen.
Oxygen should never be withheld from a patient suspected of suffering from hypoxia.

Base need for O2 on patient _____________________________ pulse ox

Upper-Airway Obstruction
Common Causes
- Tongue, Foreign Matter, Trauma, Burns
- Allergic Reaction, _____________________________

Management
Conscious Patient:
- If the patient is able to _____________________________ , encourage coughing.
- If the patient is unable to speak, perform abdominal thrusts.

Unconscious Patient:
- Perform BLS maneuvers and begin _____________________________ , looking in mouth before ventilations
- If needed, visualize the airway with the laryngoscope
- Remove foreign body with _____________________________ forceps and resume ventilations.

Adult Respiratory Distress Syndrome
- ARDS: a form of pulmonary edema that is caused by _____________________________ accumulation in the interstitial space with the lungs
- Non- _____________________________ pulmonary edema

Causes of ARDS
1. _____________________________
   - Aspiration
   - Pneumonia
   - Pulmonary Injury
   - Burns/Inhalation Injury
   - Oxygen Toxicity
   - _____________________________
   - High Altitude
   - Hypothermia
2. Near-Drowning Syndrome
   - Head Injury
   - Pulmonary _____________________________
   - Tumor Destruction
   - Pancreatitis
   - Invasive Procedures
     - Bypass, hemodialysis
   - Hypoxia, Hypotension, or Cardiac Arrest

ARDS
Pathophysiology:
- High _____________________________
• Can lead to Multiple Organ Failure
• Affects _____________________________ Fluid
  – Causes increase in fluid in the interstitial space, disrupts diffusion and perfusion.
Assessment:
• Symptoms Related to Underlying Cause
• Abnormal Breath Sounds
  – _____________________________ (Rales)

70 ARDS
Management
• Manage the underlying ____________________________ .
• Provide supplemental oxygen.
• Support respiratory effort.
  – Provide positive pressure ventilation if respiratory failure is imminent. (PEEP)
• Monitor _____________________________ rhythm and vital signs.
• Consider medications.
  – _____________________________ and nitrates normally non-effective
  – Corticosteroids to stabilize the alveolar-capillary membrane

71 PEEP
• Positive end-expiratory pressure
• A method of holding the _____________________________ open by increasing expiratory pressure
• Usually accomplished with mechanical ventilations (ventilator)
• Some _____________________________ have PEEP attachments
• ResQPOD is a variation of a PEEP device

72 ResQPOD
• Impedance _____________________________ device (IDT)
• Placed between the BVM and mask or advanced airway
• Increases _____________________________ pressure
• Increases blood flow to the brain during CPR
• Used only for adult cardiac arrest
  – _____________________________ if resuscitated
• Has lights that flash to ventilate at ________/min

73 CPAP AND BiPAP
• CPAP = _____________________________ Positive Airway Pressure
• BiPAP = _____________________________ -level Positive Airway Pressure
• Both utilizes machines or devices that produce pressure to maintain PEEP and keep the alveoli open
• Can eliminate the need to intubate certain patients by decreasing the work of breathing
• Both were developed for sleep _____________________________

74 CPAP
75 BiPAP
Differences

- CPAP delivers a predetermined level of _____________________________ pressure
  - One level and delivers a constant flow
  - Normally ____________-___________ cm H2O
  - Patient must overcome the constant pressure to exhale
- BiPAP delivers 2 levels of pressure
  - Inspiratory and Expiratory
  - Normally ____________-___________ cm H2O for inspiratory and less for expiratory
  - Lower pressures to overcome during exhalation

Differences

- CPAP is best utilized by EMS for reduction of pulmonary _____________________________
  - Presence of _____________________________ or crackles
- BiPAP is best utilized by EMS for _____________________________ patients AND for the reduction of pulmonary edema
  - Emphesema, Bronchitis, Pneumonia, CHF

CPAP and BiPAP

- Decreases _____________________________
- Decreases need for intubation
- Decreases left ventricular _____________________________ and afterload in patients with pulmonary edema
  - (pushes fluids from alveoli)

Indications for CPAP

- Patients must be over ___________ years of age
- Pulmonary edema
- Unstable: rate > ___________, pulse ox < ___________, use of accessory muscles

Indications for BiPAP

- Patients must be over 12 years of age
- CHF without rales/crackles
- _____________________________
  - Patient must be _____________________________ and able to follow commands
- Unstable: rate > 25, pulse ox < 92, use of accessory muscles

Contraindications for CPAP and BiPAP

- Respiratory/cardiac _____________________________
- Pneumothorax or _____________________________ trauma
- Tracheostomy
- Nausea, vomiting, or GI bleeding
- Full _____________________________ where mask will not seal

Procedure for CPAP

- Place patient on pulse ox and end tidal CO2 to monitor O2/CO2 exchange
• Monitor _____________________________
• Place mask on face, check for leaks
• Use ___________-___________cm H2O of PEEP
• Monitor VS
• Administer _____________________________ as needed

83  Procedure for BiPAP
• Same as for CPAP except, you must set 2 settings
• Set Inspiratory and Expiratory settings for BiPAP
  – Inspiratory ___________-___________cm H2O (Normally)
  – Expiratory ___________-___________cm H2O (Normally)
  – Settings are more _____________________________ dependant

84  Special Notes on CPAP and BiPAP
• Must make an _____________________________ seal
• CPAP therapy should be continuous
• Notify ED of CPAP use
• Watch for _____________________________ distention
• May be used on patients with DNRs

85  Key Points on CPAP and BiPAP
• As this is an invasive procedure, you must have medical direction
• Since there are numerous devices and machines, you must be familiar with what your service uses
• CPAP and BiPAP will NOT _____________________________ your patient. Don’t waste time using when the patient needs assisted ventilations
• Both require high flow oxygen, watch you oxygen bottle

86  Obstructive Lung Disease
• Types
  • _____________________________
  • Chronic Bronchitis
  • Asthma
• Causes
  • Genetic Disposition
  • _____________________________ & Other Risk Factors

87  Emphysema
Pathophysiology:
• Exposure to _____________________________ Substances
  – Exposure results in the destruction of the walls of the alveoli.
  – Weakens the walls of the small bronchioles and results in increase residual volume.
• Cor Pulmonale: hypertrophy of right ventricle due to disorders of the lung
• _____________________________: excess of red blood cells
• Increased Risk of Infection and Dysrhythmia

88  Emphysema
Assessment
● History
  – Recent weight loss, dyspnea with _____________________________
  – Cigarette and tobacco usage
● Lack of _____________________________

89 Emphysema
Physical Exam:
● _____________________________ chest.
● Prolonged expiration and rapid rest phase.
● _____________________________.
● Pink skin due to extra red cell production.
● Hypertrophy of accessory muscles.
● “_____________________________ Puffers.”

90 Chronic Bronchitis
Pathophysiology
● Results from an increase in _____________________________-secreting cells in the respiratory tree.
● _____________________________ relatively unaffected.
● Decreased alveolar ventilation.
● Assessment
History
● Frequent respiratory _____________________________.
● Productive cough.

91 Chronic Bronchitis
Physical Exam:
● Often _____________________________.
● Rhonchi present on auscultation.
● Jugular vein distention.
● Ankle _____________________________.
● Hepatic congestion.
● “_____________________________ Bloater.”

92 Bronchitis & Emphysema
Management:
● Maintain airway and support breathing.
● Find position of _____________________________.
● Monitor oxygen saturation.
● Be prepared to ventilate or intubate.
● _____________________________ cardiac rhythm.
● Establish IV access.
● Administer _____________________________.
  – Bronchodilators such as Albuterol or Xopenex

93 Asthma
Pathophysiology

- Results in widespread but _____________________________ air flow obstruction.
- The airway becomes hyperresponsive.
- Induced by a _____________________________ , which can vary by individual.
- Trigger causes release of _____________________________ , causing bronchoconstriction and bronchial edema.
- 6–8 hours later, immune system cells invade the bronchial mucosa and cause additional edema.

Asthma

Assessment

- Identify immediate threats.
- Obtain history.
- SAMPLE & OPQRST History
  - History of _____________________________ -related hospitalization?
  - History of respiratory failure/ _____________________________ use?

Physical Exam:

- Presenting signs may include dyspnea, wheezing, cough.
  - Wheezing is not present in all asthmatics.
  - _____________________________ may be limited to 1–2 consecutive words.
- Look for hyperinflation of the chest and accessory muscle use.
- Carefully _____________________________ breath sounds and measure peak expiratory flow rate.

Management:

- Treatment goals:
  - Correct _____________________________ .
  - Reverse _____________________________ .
  - Reduce _____________________________ .
- Maintain the airway.
- Support breathing
  - High-flow oxygen or assisted ventilations as indicated.

Asthma

- Monitor _____________________________ rhythm.
- Establish IV Access.
- Administer medications.
  - _____________________________ -agonists
    - Albuterol, Xopenex
    - Ipratropium bromide (Atrovent)

Status Asthmaticus

- A severe, prolonged attack that cannot be broken by _____________________________ .
- Greatly diminished breath sounds.
Recognize imminent respiratory arrest.
  – Aggressively manage airway and breathing.
  – Transport immediately.

Give Epinephrine 1: _________________ to __________ mg IM

Be prepared to intubate
  – Rapid Sequence Intubation (RSI) may be indicated

Asthma in Children

Pathophysiology and management similar.

Adjust medication _____________________________ as needed.

Children tend to _____________________________ at a much faster rate

Common Drugs Used in Respiratory Emergencies

Albuterol

Decadron

Brethine

Racemic _____________________________

Xopenex

AKA: _____________________________ Hydrochloride
Bronchodilator
Indications: Respiratory distress
Contraindications: allergic
Dosage: _________________mg/___________cc via hand held nebulizer
Side Effects: dizziness, tremor, anxiety
Normally given if Albuterol is ineffective

Decadron

AKA: _____________________________
A corticosteroid that reduces inflammation
Indications: Respiratory distress with wheezing and cerebral edema
Contraindications: Allergic
Dosage: _________________mg slow IV push
Side Effects: heart failure, hypertension, _____________________________, seizure

Solu-Medrol

AKA: Methylprednisolone, Methapred
A _____________________________ that reduces inflammation
Indications: Respiratory distress with _____________________________ . Cerebral edema
Contraindications: Allergic
Dosage: _________________mg slow IV push
Side Effects: heart failure, hypertension, arrhythmias, seizure
Brethine
- AKA: ___________________________
- Bronchodilator
- Indications: Respiratory distress with ___________________________
- Contraindications: Allergic
- Dosage: ___________mg SC
- Side effects: nervousness, dizziness, anxiety, palpitations, tachycardia, flushing

Racemic Epinephrine
- Alpha and Beta ___________________________
- Indications: Croup, Bronchial Asthma
- Contraindications: epiglottitis, hypertension, significant coronary disease
- Dosage (2.25%): ___________mg diluted in ___________cc via HHN
- Side effects: nervousness, restlessness, tremors, tachycardia, dysrhythmias, N/V
- Most commonly given to ___________________________

Rapid Sequence Intubation
- Also called Pharmacology Assisted Intubation (PAI)
- RSI is used to facilitate ___________________________ with the use of drugs on conscious patients or patients with an intact gag reflex
- RSI should be used as last resort
- RSI sedates and ___________________________ patients, thus causing
  ________________
- Failure to successfully intubate could result in uncontrolled airway on a non-breathing patient

Indications for Rapid Sequence Intubation
- Respiratory ___________________________
- Inhalation injuries
- ___________________________ injuries
- Prolonged seizure activity
- ___________________________ reactions where airway is swelling
- Status Asthmaticus
- Other conditions where intubation is indicated but not possible without RSI

Possible Drugs Used in RSI
- ___________________________
- Etomidate
- Succinylcholine
- Rocuronium
- ________________
- Lidocaine: for patients with head injury
- ________________ : for pediatric patients

Versed
- AKA: Midazolam Hydrochloride
- A ___________________________ anxiolytic
Indications: Patients in need of sedation
- In EMS, most often used for RSI, sedation for pacing and __________________________________________________________________, and for chemical sedation of violent patients

Contraindications: Allergic

Versed
- Dosages:
  - For RSI: ___________ mg/kg to a maximum of ___________ mg
  - For cardioversion/pacing: ___________ mg IV push
  - For chemical restraint: ___________ mg IV push or IM
  - Repeated every 5-10 minutes to maintain sedation
- Side Effects: decreased respiratory rate

Etomidate
- Anesthetic/hypnotic
- Indications: patients in need of sedation
- Half-life of only ___________ - ___________ minutes
- Contraindications: Children < 2YOA
- Dosage: ___________ mg/kg up to ___________ mg
  - Normally, ___________ repeat dosage in EMS, due to steroid reduction
  - If further sedation needed use alternative (Versed)
- Side effects:
  - __________________________________________________________________
  - Decreased steroid levels
  - __________________________________________________________________ following regaining of consciousness

Succinylcholine
- AKA: __________________________________________________________________
- __________________________________________________________________ Neuromuscular Blocker (paralytic)
- Indications: need for RSI
- Contraindications: Allergic, burns > 48 hours old, kidney dialysis patients, chronic paralysis
  - Sux can cause release of potassium that is negligible in a typical person but is greatly increased in persons with these conditions
- Dosage: ___________ - ___________ mg/kg rapid IV push
- Side Effects: bradycardia, arrhythmias, apnea
- Note: bradycardia is more significant in ___________________________ patients

Rocuronium
- AKA __________________________________________________________________
- Non-depolarizing neuromuscular blocker (paralytic)
- Indications: need for RSI
- Contraindications: Allergic. Use caution with known heart or liver disease
- Dosage ___________ to ___________ mg/kg IV or IO
- Normally, not given to pediatrics in EMS
● Side Effects: flushing, tachycardias, urticaria
● Lasts up to ___________ minutes

115 Norcuron
● AKA: _____________________________, Vecuronium Bromide
● Non-deploring neuromuscular blocker
● Indications: Need for RSI
● Contraindications: Allergic. Use caution with known heart or liver disease
● Dosage: ___________ - ___________ mg/kg IV or IO
  – May repeat once at ___________ mg/kg in 20-40 minutes
● Side effects: tachyarrhythmias, urticaria

116 RSI Procedure
● Pt should be connected to _____________________________ monitor and pulse ox
● ECG should be watched carefully for _____________________________ and other
dysrhythmias during ET attempt
● Oxygen saturation should NOT be permitted to fall below ________%

117 RSI Procedure
● Make sure patient is _____________________________ prior to administration of
  medications and intubation attempt
● Insure _____________________________ of IV line(s)
● Administer _____________________________ (Versed or Etomidate)

118 RSI Procedure
● Administer Lidocaine __________mg/kg up to 100mg IF head injury
  – Manipulation of the larynx causes both reflex elevation of ICP and secretion of
    _____________________________ which can both decrease blood flow to the brain
  – Lidocaine blunts the effects of both

119 RSI Procedure
● Administer _____________________________ 0.01mg/kg to pediatric patients (<16yoa)
  – Stimulation of the _____________________________ nerve can result in bradycardias
  – Pediatrics have an increased sensitivity to vagus nerve effects and can produce severe
  _____________________________

120 RSI Procedure
● Administer _____________________________ (Succinylcholine, Rocuronium, or
  Norcuron)
● Perform intubation once adequate sedation is achieved
  – If sedation is achieved after sedative, do _____________________________
    administer paralytic
● Maintain sedation as needed
● Maintain _____________________________ management as needed

121 RSI Considerations
● If adequate sedation after sedative medication, do NOT give paralytic…….
Be sure to use sedative first.
Use _____________________________ capnography if available
Succinylcholine, Rocuronium, and Norcuron are paralytics but do not cause the patient to loose consciousness
- Patient will be conscious but unable to _____________________________

During Preparation for RSI, Ask Yourself……..
- Does the patient truly need intubation?
- Can I _____________________________ ?
- Can I ventilate?
- Do I have other _____________________________ ?
  - King Airway, Combi-Tube
- Is the equipment assembled and ready?
- Are there any _____________________________ to any medication?
- Remember, just because we can doesn’t mean that we should

Upper Respiratory Infection (URI)
- Frequent patient complaint
  - Common pediatric complaint
- _____________________________ life threatening
Pathophysiology
- Frequently caused by viral and bacterial _____________________________.
- Affect multiple parts of the upper airway.
- Typically resolve after several days of symptoms.

Upper Respiratory Infection (URI)
- Assessment
  - Look for underlying _____________________________.
  - Evaluate pediatrics for epiglottitis.
- Management
  - Maintain the airway.
  - Support breathing.
  - Treat signs and _____________________________.

Pneumonia
- _____________________________ of the Lungs
  - Immune-Suppressed Patients are more susceptible
Pathophysiology
- Bacterial & Viral Infections
  - Hospital-acquired vs. community-acquired.
  - Infection can spread throughout lungs.
  - _____________________________ may collapse, resulting in a ventilation disorder.

Assessment of Pneumonia
Focused History & Physical Exam
- SAMPLE & OPQRST
  - Recent _____________________________, chills, weakness, and malaise
Deep, productive cough with associated pain

- Tachypnea and tachycardia may be present.

Breath sounds:
- Presence of rales/_______________________________ in affected lung segments
- Decreased______________________________ movement in the affected lung

Management of Pneumonia
- Maintain the airway.
- Support breathing.
  - High-flow oxygen or assisted_____________________________ as indicated.
- Monitor vital signs.
- Establish IV access.
  - Avoid fluid______________________________.
- Medications
  - Antibiotics, antipyretics,_____________________________ -agonists.

Lung Cancer
- Pathophysiology
- General
  - Majority are caused by______________________________ secondary to cigarette smoking or occupational exposure.
  - May start elsewhere and spread to lungs.
  - High______________________________.

Lung Cancer
Assessment
- Focused History & Physical Exam
  - SAMPLE & OPQRST History
    - Cancer-related______________________________ and hospitalizations.
  - Physical Exam
    - Evaluate for severe respiratory distress.
Management
- Follow general principles.
  - Administer oxygen, support ventilation.
- Provide______________________________ support.

SARS
Severe Acute Respiratory______________________________ (SARS)
- SARS-associated coronavirus (SARS-CoV)
- ____________________________ respiratory illness that first appeared in southern China in 2002 and became a global threat in 2003
  - 8,098 people worldwide were affected.
  - 774 died.

SARS Characteristics
- ____________________________ respiratory infections.
- Similar to the common cold.
● SARS-CoV apparently may survive in the environment for several ________________.
● Close person-to-person contact via respiratory droplets.
● The incubation period is generally __________ to ___________ days but in some cases has been as long as 10 to 14 days.
● Contagious as long as symptomatic.

132 □ All SARS Victims Experience:
1. Sore throat
   ● ___________________________ (runny nose)
2. Chills
   ● ___________________________ (sudden paroxysmal chills)
3. Myalgias (muscle aches)
4. Headache
5. Diarrhea
6. ___________________________
7. Sputum production
8. Respiratory distress
9. Eventual respiratory failure

133 □ Management of SARS
● Normally will be notified of SARS outbreak
● Position of ________________________________
● Administer oxygen
● IV fluids
● Monitor cardiac rhythm and pulse oximetry
● Provide ___________________________ assistance
● Intubate for severe respiratory distress or failure
● Nebulized ___________________________ for bronchospasm
● Notify the receiving hospital if you suspect SARS so that they can take appropriate protective measures

134 □ Toxic Inhalation
Pathophysiology:
● Includes inhalation of heated air, ___________________________ irritants, and steam.
● Airway obstruction due to edema and ___________________________ due to thermal and chemical burns.
Assessment:
● Focused History & Physical Exam
  – SAMPLE & OPQRST History
    ● Determine ___________________________ of substance.
    ● Length of exposure and loss of consciousness.

135 □ Management of Toxic Inhalation
● Ensure scene ___________________________.
  – Enter a scene only if properly trained and equipped.
  – ___________________________ the patient from the toxic environment.
• Maintain the airway.
  – Early, aggressive management may be indicated.
• Support breathing.
• Establish IV access and monitor ECG
• Transport promptly.

136 Carbon Monoxide Inhalation
• Odorless, _____________________________ Gas
• Results from the _____________________________ combustion of carbon-containing compounds.
• Often builds up to dangerous levels in confined spaces such as mines, autos, and poorly ventilated homes.
• Hazardous to Rescuers

137 Carbon Monoxide Inhalation
Pathophysiology:
• Binds to _____________________________
  – Prevents oxygen from binding and creates hypoxia at the cellular level.
Assessment:
• Focused History and Physical Exam
  – SAMPLE & OPQRST History
  – Determine source and _____________________________ of exposure.
  – Presence of _____________________________ , confusion, agitation, lack of coordination, loss of consciousness, and seizures.

138 Carbon Monoxide Inhalation
Management:
• Ensure scene safety.
  – Enter a scene only if properly trained and equipped.
  – Remove the patient from the toxic environment.
• Maintain the airway.
• Support breathing.
  – High-flow _____________________________ or assisted ventilations as indicated.
• Establish IV access and monitor _____________________________ .
• Transport promptly.

139 Pulmonary Embolism
Pathophysiology:
• Obstruction of a pulmonary artery
  – _____________________________ may be of air, thrombus, fat, or amniotic fluid.
  – Foreign bodies may also cause an embolus.
• Risk Factors
  – Recent _____________________________ , long-bone fractures, pregnancy.
  – Pregnant or postpartum.
  – Oral _____________________________ use, tobacco use.

140 Assessment of PE
Focused History & Physical Exam:

- **SAMPLE & OPQRST History**
  - Presence of _____________________________ factors
  - _____________________________ onset of severe dyspnea and pain
  - Cough, often _____________________________ -tinged

- **Physical Exam**
  - Signs of heart failure, including JVD and hypotension
  - Warm, swollen extremities

141  Management of PE

- Maintain the airway.
- Support breathing.
  - High-flow oxygen or assist ventilations as indicated.
  - _____________________________ may be indicated.

- Establish IV access and monitor _____________________________
- Monitor vital signs closely.
- Transport to appropriate facility.

142  Spontaneous Pneumothorax

Pathophysiology:

- Pneumothorax that occurs in the _____________________________ of blunt or penetrating trauma.

Assessment:

- **Focused history**
  - SAMPLE & OPQRST history.
  - Presence of risk factors.
  - Rapid onset of symptoms.
  - Sharp, _____________________________ chest or shoulder pain.
  - Often precipitated by _____________________________ or lifting.

143  Spontaneous Pneumothorax

Physical Exam:

- Decreased or absent breath sounds on affected side
- _____________________________, diaphoresis, and pallor

144  Spontaneous Pneumothorax

Management:

- Maintain the airway.
- Support breathing.
- **Monitor for _____________________________ pneumothorax.**
  - Pleural decompression may be indicated if patient becomes cyanotic, hypoxic, and difficult to ventilate.
  - _____________________________ and tracheal deviation away from the affected side.

145  Hyperventilation Syndrome

Assessment:
Focused History & Physical Exam
- SAMPLE & OPQRST history.
  - Fatigue, nervousness, dizziness, dyspnea, _____________________________ pain.
  - Numbness and _____________________________ in hands, mouth, and feet.
- Presence of tachypnea and tachycardia.
  - _____________________________ of the fingers and feet.
- May mimic an MI

Hyperventilation Syndrome
Management:
- Maintain the airway.
- Support breathing.
  - Provide high-flow oxygen or assist ventilations as indicated.
  - Do NOT allow the patient to _____________________________ exhaled air unless absolutely sure of diagnosis.
- Monitor _____________________________
- Reassure the patient.

CNS Dysfunction
Pathophysiology
- Causes can include traumatic/atraumatic brain injury, tumors, and _____________________________.
Assessment:
- Evaluate potentially treatable _____________________________, such as narcotic drug overdose or CNS trauma.
- Carefully evaluate breathing pattern.

CNS Dysfunction
Management:
- Follow general management principles.
  - Blood _____________________________ level
  - Monitor ECG
- Maintain the airway and support breathing.
- Use cervical spine precautions if indicated.

Dysfunction of the Spinal Cord, Nerves, or Respiratory Muscles
Pathophysiology
- _____________________________ problems affecting respiratory function may include trauma, diseases, viral infections, tumors.
Assessment
- Rule out traumatic injury, and assess for numbness, pain, or signs of _____________________________ dysfunction.

Dysfunction of the Spinal Cord, Nerves, or Respiratory Muscles
Management:
● Follow general management principles.
  – _____________________________, IV access, monitor ECG, etc.
● Maintain the _____________________________ and support breathing.
● Use cervical spine precautions if indicated.
Phases of Waveform Capnography

Diagram showing the different phases labeled A through E with corresponding labels I through IV on the graph.