

EMS: Mass Casualty Triage

Phil Giddings PGY-2

Mass Casualty: Resources are overloaded

-Type 1-3 -based on how many patients

-Triage: to sort and select

- MUCCC: model Uniform Core Criteria-

Green: minimal injury- self-limited injury can tolerate extended delays in treatment without increased mortality risk

Yellow: Delayed-deep lacerations with hemostasis, open fractures, abdominal injuries with stable vitals, head injuries with intact airway

Red: IMMEDIATE- unresponsive, AMS, Respiratory distress. Uncontrolled hemorrhage, amputation, proximal to elbow or knee, pneumothorax, cyanosis, weak pulses

Black: Deceased- no respirations following basic airway maneuvers

SALT TRIAGE

Sort: 3 categories: Walk (assess 3), Wave/purposeful movements (assess 2nd), Still Obvious life threaten assess 1st)

Assess: individual assessment →

Life-saving interventions

- Control hemorrhage, open airway (consider rescue breaths in children), chest decompression, and auto injector antidotes
 - Minimal
 - Delayed
 - Immediate
 - Expectant
 - Dead

Treatment/transport

START TRIAGE

-based off of respirations

Tachypnea → perfusion → control bleeding → care

Pediatrics- JUMP START for triage

Respiratory Emergencies

PEM-Dr. Said

Croup: acute subglottic inflammatory process

-6months to 3 years (morbidity is greatest in first year of life)

-etiology: Parainfluenza 1 and 3 most common (Influenza, human metapneumovirus, RSV) and COVID

- Presentation: 1-3 days URI sx and seal like cough, +/- stridor, clinical diagnosis

- if you cannot r/p epiglottitis or foreign body get a lateral neck x-ray (steeple sign)

- Severity: Severe (barky cough and stridor at rest)

Moderate (stridor with agitation and barky cough)

Mild barky cough no stridor

-Treatment: Give Decadron 0.6 mg/kg

Racemic epi: stridor at rest → then watch for 2-3 hours for rebound swelling

Other Therapies: Heliox, if you need to intubate (use tube that is 1-1.5 smaller)

Foreign Body Aspiration

-Small children are at higher risk

-Anatomic immature: High epiglottis and immature swallowing coordination

-Acute: lead to respiratory distress, immediate episode of coughing, gagging, choking or cyanosis

-Delayed: younger kids (not verbal)

- may lead to: persistent febrile illness, chronic cough, recurrent pneumonia, recurrent croup, lung abscess, hemoptysis
- location: Larynx: obstruction, Trachea: biphasic stridor or dry cough, Bronchus (80-95%): cough wheeze and decreased breath sounds, Esophagus: can impinge the trachea in small children

-CXR:

50% will have negative CXR

- If high enough suspicion should be bronched, most sensitive indicator is witnessed aspiration
- Xray: hyperinflated lung, ATX, pneumonia (if delayed)

Choking

- Infants <12 months: 5 back blows followed by 5 chest compressions using 2 fingers, baby's head should be tilted
- Children >1 year: Heimlich maneuvers

Partially occluded airway

- Place child in sniffing position, provide supplemental oxygen, do not perform maneuvers that may dislodge the FB and move it to the central airway, Rigid Bronchoscopy needed

Bronchiolitis: acute inflammation of lower airways, increased mucous production, edema of small airways, bronchospasm and V/Q mismatch

- Most common respiratory wheezing under 2 years. Occurs in winter
- Etiology: RSV
- Severe:

respiratory rate depends on age (50 as a general number)

retractions: intercostal, sub costal, supraclavicular

PO intake: Decreased

Other: apnea, cyanosis

-Management:

- examine patient from waist up. Evaluate signs of respiratory distress or heart disease
- supportive care: O2 vs HFNC prn, IV, Suctioning

Asthma

- Clinical Presentation: Dyspnea wheezing and cough, can have retractions due to obstruction, AMS in those with impending ventilatory failure
- Complications: pneumothorax and pneumomediastinum
- Management: CXR not routine
 - albuterol
 - ipratropium both nebulized
 - magnesium 50-75mg/kg bolus
- Ventilation: Intubation
 - incidence is 0.55% associated with higher mortality
 - Complications: can cause cardiac arrest, hypotension occurs as a result of hyperinflation leading to decreased cardiac preload
 - Expiratory time: 4-5 second I:E ratio should be 1:4
 - Ketamine for sedation

Lightening Lectures

Pleural Effusions: Alaina Royalty, MD PGY1

- Abnormal collection of fluid within the pleural space between parietal and visceral pleura
- Transudative: increased hydrostatic pressure or low oncotic pressure: **CHF**, Cirrhosis, Nephrotic, PE, Hypoalbuminemia, myxedema, peritoneal dialysis, SVC obstruction

- Exudative: occurs due to inflammation and increased capillary permeability: Pneumonia, Cancer, Tb, viral infection, PE, autoimmune, GI disorders, Chylothorax, medications
- CXR: at least 200ml required to be seen on upright AP/PA
 - blunting of costophrenic angle
- US thoracic: detects as little as 5-50cc's best to have the patient is sitting up
- Thoracentesis:
 - New effusions with unknown cause likely need diagnostic thoracentesis: however, does not typically need to be done emergently
 - Therapeutic:** should be done for massive effusions mediastinal shift, hemodynamic instability if you suspect empyema, or esophageal rupture **this will be done in THE EMERGENCY DEPARTMENT**
 - Test: cell count differential, pH, protein, LDH, Glucose
 - REMEMBER LIGHTS CRITERIA via protein, LDH

Acute Respiratory Distress Syndrome (ARDS): Craig Schutzman PGY1

- Non cardiogenic pulmonary edema
- Clinical: worsening dyspnea, hypoxemia and bilateral diffuse crackles
- Many common cause: sepsis, pancreatitis, TRALI, trauma
- Pathophysiology:
 - Exudative phase → proliferative phase → Fibrotic phase (bad prognosis)
 - Berlin Criteria
- Labs: are non specific → But get proBNP/BNP
 - ABG: elevated pH, low PaO₂, Low PaCO₂, low-normal HCO₃ (acute hypercapnic respiratory acidosis indicated severe disease, impending respiratory arrest)
- Imaging: CXR: diffuse ground glass opacities, CT chest: bilateral opacities widespread
- Management:
 - treat underlying cause
 - Supplemental oxygen
 - Analgesia, sedation and paralysis
 - Sedation improves tolerance to ventilation and decrease oxygen consumption
 - Lung protective Ventilation
 - Ventilator Mode: Volume AC
 - tidal Volume: low per Ideal body weight -6 cc/kg
 - Inspiratory flow rate 60-80 lpm
 - respiratory rate: 16-18
 - FIO₂/PEEP: titrate to spO₂ goal 88-95% (can have permissive hypercapnia)
 - maintain plateau pressure <30 mmHg to prevent barotrauma
 - GO TO ARDS NET FOR ALL YOUR ARDS FRIENDLY INFORMATION!**
 - PRONING ventilation: V/Q mismatch improves as depending lung receives majority of blood flow as alveoli open
 - Steroids: only give if severe, look at the Meduri Protocol
 - ECMO: early application <1 week is crucial for success

COPD Exacerbation: Mitchell Weeman PGY1

- Persistent air flow limitation that is progress and assisted with enhanced chronic inflammatory response in the lungs to noxious particle or gas
- Clinical: dyspnea, productive cough, decreased physical activities, +/-wheezing. End stage: cor pulmonale, muscle wasting, chronic ventilatory failure
- Diagnosis: via PFT
- Management:
 - ABC: IV, telemetry, O₂ saturation, vitals
 - O₂ correct to baseline if unknown 90-94%

- EKG, trop, BNP, CXR, CBC, CMP, ABG for accurate PaO₂
- Mild: DuoNeb or single agent +/-steroids and abx
- Moderate: same as mild plus Prednisone 60mg or Solumedrol 125mg IV and abx, /-Magnesium, BIPAP
- Severe: same as above: plus BIPAP (10/5 is a good setting) , IV steroids.
 - +/- intubation use ketamine or etomidate (FIO₂100%, TV 6-8 cc/kg, RR: 8-10, PEEP 5-8)
 - Magnesium

-Disposition:

- Uncomplicated: can go home- they have no comorbidities, <65 y/o <3 exacerbations per year, FEV >50%
 - Give steroid 3-5 days, abx refill nebs and follow up with PCP
- Complications: new or increased o₂ requirements or needing BIPAP, AMS due to hypercapnia, inability for self care or risk of poor follow up

Room 9 follow up

MB Hatch PGY3

- for Boards do not take a hypotensive patient to the CT scanner
- resuscitation is key

Cognitive dispositions to respond

- Anchoring and diagnosis momentum
- Base rate bias, multiple alternative bias, and confirmation bias
- Commission and Omission Bias: feeling bias that you have to intervene
- Feedback sanction: we don't see the long-term consequences
- Gamblers Fallacy thinking that everything is going to be fine because everything else has been fine
- Overconfidence and sunk cost
- Vertical Line failure: patterns of thinking, and not straying from the regular thinking. You need to lateral think as well
- Visceral bias: doing things by anticipating what people want from you

What can we do?

- Practice mindfulness, ask yourself "what else might this be?", create metacognitive processes, contribute to a supportive culture, participate in institutional review

Ventilator Management:

Dr. Richie

- Indications: Acute failure, airway protection, respiratory arrest, upper airway trauma, relive work of breathing operative procedures
- Oxygenation improved with increased Flo₂ and increase PEEP
- Ventilation: respiratory rate and tidal volume
- PIP : Peek Inspiratory pressure
 - pressure at the end of inspiration
 - high peak pressures are not good >30 or 40
- Compliance: change in volume/change in pressure
 - most people >50, intubated about 30
 - ARDS is 15 or less
 - decreased compliance: pulmonary edema, pneumonia, ARDS, pneumothorax, obesity, burns, ascites, abdominal compartment syndrome.
 - Increased: COPD

Modes of Ventilation:

- Pressure: push in a constant pressure (flow will vary)
- Volume: push in a constant flow (pressure will vary)

Types of breaths

-Mandatory: machine initiated, machine does the work

-Assisted: patient initiates breath, patient does some work and ventilator assists

Assist control Ventilation (AC)

-set rate and set volume or pressure

-If patients breathe over set rate it will assist at the same preset volume or pressure

- If a patient wants to take a breath at 10 sec they will get 500cc regardless of whether he wants 300cc or 700cc

SIMV: similar to assist control but patient initiates breaths can be different set support

Pressure Control: set pressure. Variable flow, set rate, Cycle time:

- You set I time

Volume Assist control: set volume, variable pressure, set rate Cycle time

- If patient wants more volume because they feel air hunger it wont let them get more flow, it can be very distressing
- COPD, increased dead space, may need larger volume, and patient can feel distress because they need a much larger flow and

Pressure Support: set pressure, variable flow, patient determined RR, cycle flow

- There is no back up rate
- Most tolerable and most like natural breathing
- Good for COPD, but you need to think about I:E Ratio

PRVC: pressure give can change breath to breath

- Best of both worlds
- Need to give I time (set to 1 second)

Trouble shooting:

Peak inspiratory pressure vs Plateau Pressure

High plateau: alveolar level problems

-inspiratory pause and they are very different: something wrong with large airways, or ventilator problem

- easy to bag vent problem, hard to bag large airway vs ET tube problem

-not very different think alveolar

Air trapping: responds to increased PEEP, bronchodilators,

-Ineffective trigger: if patient is spontaneous breathing are they triggering the ventilator

Ventilator induced lung injury