Decision to tube

1. Failure to maintain or protect the airway
   - Can't handle gastric and oral secretions
2. Failure to ventilate or oxygenate
   - ABG rarely useful
3. Pts' anticipated clinical course and likelihood of deterioration
   - multiple trauma, open#, neck trauma, burns

Identifying the difficult airway (to plan steps 1-2-3-1):

- Diff. DL
  - "The lemon test" if yes to anything: tread carefully!
  - LEMON
    - look for gestalt signs:
      - ***KEY sign is the presence of an underbite: if the patient CANNOT bite their upper lip with their lower teeth (buck teeth boy) they will be a very difficult tube!!***
    - evaluate the 3-3-2 rule
      - A high riding larynx and receding mandible = impossible tube
    - Mallampati score:
      - use a Laryngoscope to visualize in obtunded pts.
    - Obstruction or obesity
      - epiglottitis, ludwig's angina,
    - Neck mobility
      - Ank. spondylosis, Rheumatoid Arth,

- Diff BVM
  - MOANS
    - Mask seal
    - Obstruction or obesity
    - Age > 55
    - No teeth
    - Stiffness of chest
      - asthma, COPD, pregnancy

- Diff. Extraglottic device
  - RODS
    - Restricted mouth opening
    - Obstruction/obesity
    - Distorted anatomy
    - Stiffness to ventilate

- Difficult Cricothyrotomy
  - SMART
    - Surgery
    - Mass (abscess, hematoma)
Access/anatomy problems (obesity, edema)
- Radiation
- Tumor

- Cormack Lehane grading view
  - 1-4
    - 4 = not even the epiglottis seen.
    - 2a = arytenoids and portion of vocal chords, 2b=arytenoids only
  - POGO system can also be used

- Confirmation of placement
  - most serious complication: unrecognized esophageal tube: and anoxic injury**
  - Traditional methods (misting, listening over lungs, chest rise) are unreliable
    - Colorimetric ETco2
      - Yellow = yES!
      - ***need to do at LEAST 6 manual breaths to confirm placement
      - in cardiac arrest c02 detection will be impaired
    - Ultrasound of trachea
    - palpation during intubation
    - Aspiration technique (With cuff deflated)
    - Quantitative colorimetric ETco2
    - A single chest radiograph doesn't confirm placement (AP overshadows esophagus)
  - Causes of failure of ETco2
    - complete obstruction
    - asthma

Approach to intubation:
- Questions to ask:
  - is this a crash airway?
  - Is this a difficult airway?
    - no to both = do RSI

- Crash airway = no drugs, except a single LARGE dose of Succx.(2mg/kg) if unable to tube
- Failed airway =
  - failure to intubate despite 3 attempts at RSI
    - ****failure to oxygenate using BVM or EGD****
  - OR: experienced clinician identifies a grade 4 view on their first attempt.

- Difficult airway
  - is predicted based on the previous mnemonics
  - ***NMBAs should not be used unless:
    - you are forced to act
    - intubation is likely to be successful
    - oxygenation via BVM or EGD is possible
○ If a difficult airway is predicted and oxygenation is OK
  i. RSI, with double setup and backup ready
  ii. Awake intubation

● Failed airway
  ○ IF oxygenation cannot be maintained = failed airway → Cric!!
    i. unless you have an EGD *immediately* available
       ● ONLY one attempt should be made with this and it shouldn't delay cric!

● Methods of intubation
  ○ RSI = "simultaneous administration of a potent sedative and NMBA"
    i. No interposed assisted ventilation
    ii. Requires a period of preoxygenation (3 mins) and the other 7 P's
    iii. Desat times (<90%)
        ● Adult healthy: 8 mins
        ● adult, sick: 5 mins
        ● obese adult: 2-3 mins
        ● child: 3-4 mins
    iv. Pretreatment (at least 3 mins before induction)
        ● For three at risk groups:
          a. Reactive airways: +/- Lido 1.5 mg/kg
          b. CV disease: Fentanyl 3 mcg/kg/*
          c. Inc. ICP: +/- Lido 1.5 mg/kg + Fentanyl 3 mcg/kg
    v. Postintubation mgmt!
  ○ Blind nasotracheal intubation
  ○ Awake oral intub.
    i. Sedative and topical agents
  ○ Oral intubation without pharm agents
    i. eg. crash airway

● Pharm agents:
  ○ NMBA's
    i. do not cross placenta or BBB
    ii. work by mimicking the Ach molecule
       ● Succinylcholine: Depolarizes the motor end plate at Ach
         a. decreased plasma pseudocholinesterase increases the amount of Succ. available
         b. 45 sec to effect.
         c. spont. respiration recover at 6-10 mins
         d. 1.5 mg/kg regardless of obesity
           ■ minor cardiovasc effects (bradyC. in some kids)
           ■ fasciculations and myalgias
           ■ hyperkalemia
● ! up to six months post injury (stroke), never with MS, ALS, muscular dystrophy
● careful in renal failure patients
  ■ masseter spasm: known occurrence
    o trxt: rapid bolus of Rocuronium and tube em!
  ■ Malignant Hyperthermia
    ● never been reported after an ED intubation
    ■ requires refrigeration
● Rocuronium: nondepolarizing, competitive (prevents access of Ach on the receptors)
  a. dose: 1-2 mg/kg
  b. lasts 50 mins
  c. onset 60 secs
  d. NO contraindications
○ Induction agents:
  i. Etomidate
    ● hemodynamically stable. 0.3mg/kg IV
      a. decreases ICP and cerebral blood flow without affecting MAP
      b. brief myoclonus
      c. prolonged doses causing adrenal suppression **not clinically relevant
  ii. Ketamine
    ● 1-2 mg/kg IV. onset in 30 sec, peaks in 1 min, 10-15 mins duration
    ● creates a cataleptic state
    ● excellent choice in unstable patients, asthmatics, sepsis, trauma
    ● causes catecholamine release, bronchodilation
    ● NO clinically relevant ICP, CBFlow,
      a. maybe avoid in the hypertensive TBI *
    ● can cause emergence reactions (Trxt with benzos)
  ●
  iii. Propofol
    ● 1.5-2 mg/kg IV
    ● decreases ICP, cerebral 02 usage, myocardial depression
    ● hypotension, pain at site of administration
    ● BE cautious: elderly, hemodynamic compromise/cardiac instability,
    ● Not be used in those with a soybean/lecithin/egg protein anaphylactic allergy
iv. Midazolam
- 0.2-0.3 mg/IV
- onset 30 sec. duration 15-20 mins.
- cautious reduced doses in the elderly.

v. Intranasal sedation:
- Intranasal sedation protocol: (from Intranasal.net)
  General points:
  • Midazolam, ketamine, dexmedetomidine and sufentanil are the most commonly used sedative medications for IN delivery.
  • Midazolam results in mild somnolence with resultant reduction in anxiety and probably amnesia. It will not make the patient unconscious. Be aware that midazolam causes some nasal burning for 30-45 seconds when administered.
  • In small children you should administer lidocaine 2% or 4% - 0.2 ml per nostril 5 minutes prior to the midazolam to stop the burning.
  Combination therapy with midazolam plus either sufentanil or ketamine may work better than any of the medication alone. Reasonable IN starting dose:
  • Midazolam 0.4 to 0.5 mg/kg
    Use the lower dose for minor, non-painful procedures such as radiographic imaging
    Use the higher dose for better sedation prior to procedures such as laceration repair
    Ketamine 10 mg/kg
  Midazolam plus ketamine: 0.2 to 0.3 mg/kg of midazolam plus 5 mg/kg of ketamine
  Use only concentrated midazolam (5 mg/ml) and ketamine formulations
  Be sure to monitor oxygen saturation in all patients
  Ideal volume is 0.3 to 0.5 ml per nostril, maximum is 1 ml per nostril, more will just run out nose.
  Nasal naloxone and flumazenil can be used as reversal agents

SPECIAL INTUBATING CIRCUMSTANCES
- Status Asthmaticus
  - unsuccessful RSI followed by prompt cricothyrotomy (No EGD or BVM!)
  - Pre-treat with lidocaine 1.5 mg/kg IV
  - Beta agonist in line - continuous albuterol nebs
  - Ketamine
- Reflex sympathetic response to laryngoscopy
  - Important to mitigate this in
    i. **Increase ICP
    ii. ICH / SAH / Aortic dissection / Ischemic heart disease
    iii. Fentanly 3 mcg/kg IV over 60 seconds** (prevents rigid chest, apnea,)
- Elevated ICP
  - need to reduce secondary neuro. injury by keeping MAP at 100
  - treatment
Crack Cast show notes. Episode 1.
www.crackcast.org

- i. elevated HOB
- ii. pretreat with fentanyl
  - 3 mcg/kg IV over 60 sec
- iii. IF time permits also pretrxt with Lidocaine 1.5mg/kg
- iv. Etomidate / Ketamine + NMBA

- C Spine injury
  - VideoLyrngsp
    - i. less lifting force or Spine mvmt
  - critically think if a cspine injury is actually suspected-based on mechanism, neuro exam

- Pediatric tube
  - Airway differences:****
    - i. higher larynx (more acute angle oropharynx to larynx -- may need BURP)
    - ii. high, soft and floppy epiglottis
    - iii. prominent occiput (put towel under shoulders)
    - iv. short airway (dont tube the bronchus)
  - need a higher dose of Succx. (2mg/kg)
  - may need jet ventilation in young children ?<8-10yrs

airway devices
- DL
- VL
  - for technique see EMCRIT podcast: put tube in mouth before blade  if narrow opening
  - introduce: middle of mouth, rigid stylet (lube it up first),

- Intubating stylets/scopes
  - useful in angioedema, blunt neck trauma, awake intubation, burn patients,

- EGD's
  - LMA, ILMA, I-gel
  - King, combitube---designed to have you intubate the esophagus and then ventilate through a side port

- surgical mgmt
  - needle cricothyrotomy with transtrach. jet ventilation
  - kids with supraglottic obstruction
  - cricothyrotomy
    - used in a can't intubate , can't ventilate scenario
      - scalpel, finger, bougie and 6.5 cuffed tube.
Case 1
- Obese male: with pneumonia/pneumosepsis
  - Preparation:
    - prepare patient, equipment, drugs, mentally go through your plan with the team!!! and the room!!!
    - rehearse the recipe with the room
      - rehearse what will happen if it goes south
        - epi, atropine, etc.
        - surgical airway
        - someone tells me when the sat is 94...
  - preoxygenation
    - technically 3 mins or 8 TV breaths
    - if no success with NRB then: (SP02<95%)
      - think about shunt physiology: (ARDS, atelectasis, etc)
    - BVM with a PEEP valve or CPAP/BIPAP as a temporizing measure
      - using the BVM: breathe WITH the patient
      - hold the BVM on the face the entire cycle and squeeze the bag with inspiration, and hold the mask in place for expiration
      - if no effect prepare for intubation
  - Positioning
    - ear to sternal notch
      - "face parallel to the ceiling"
      - "ears level with thee sternal notch"

Case 2:
- 21 year old asthmatic, with no effect with standard asthma treatment:
  - DSI!!! PAPER as evidence
    - Ketamine 1 mg/kg and 0.5mg/kg prn for
    - BIPAP/CPAP and or MASK when calm
    - q15 min ABG's, or VBG's (PCO2 and Ph)
    - Ketamine infusion
  - "I recognize that a RELATIVE contraindication to NIPPV" is altered LOC
    - but based on recent studies it has been shown to be safe
  - This is a known difficult airway in a forced to act scenario
  - Paralytic agents
    - sugammadex reversal agent for Roc is coming down the pipeline
    - the decision to intubate is key - no matter what your drug choice, if you choose to paralyse you have to bear with the repercussions
    - I want the BEST chance on my first attempt.
  - Roc.
    - in every case except status epilepticus
• buys time to get postintubation care...lines, tuuuubes, meds
  ■ Succ.
  • can't redose it!!!
  • slow respiratory return.....
  • shorter time to desaturation!!!

Case 3:
  ○ multitrauma case with bad airway
  ○ when and how do you teach
  ● Videolaryngoscopy view:
    ● turn the tube COUNTER CLOCKWISE if it's hitting the cords

Case 4:
  ○ obese, no neck, aspiration, needs intubation:
  ○ DON'T paralyse
    ■ try and awake look. !!!
    ■ think about putting a guidewire in the neck and then look from above that way if you need to cut you know your anatomy.

Case 5 exchanging a tube:
  ○ ASSUME that it's a brand new intubation, have everything ready with paralytics and meds and new equipment just in case
  ○ don't half ass it and assume it will go smoothly
  ● Angioedema case
    ○ if forced to act, consider an AWAKE CRIC
    ○ call for help early
    ○ nearly stupid to try from above! you only have ONE CHANCE
  ● GI bleed case:
    ○ if you oesophageal intubate leave the tube in, then you know where the tube is,
    ○ then try to intubate