AAFP GLOBAL HEALTH SUMMIT
Primary Health Care and Family Medicine: Health Equity for All

Airway Emergencies in Resource Limited Settings

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Disclaimer

The views expressed in this presentation do not necessarily represent the views of the United States Public Health Service, the Indian Health Service, or the United States Government.

Objectives

- Develop the knowledge and skills necessary to manage airway emergencies that Family Physicians are likely to encounter while working in resource limited environments
- Learn which airway emergencies require urgent recognition and transfer when appropriate
- Build an airway equipment kit for various practice environments

Case 1

- Training exchange in Hoi An, Vietnam
- Regional medical clinic/urgent care
  - ACLS facility, decent med room
- Local partner asked you to cover for the morning
- She texts you at 0700
  - Slight fever, barking cough, hoarse cry
- Takes 20 minutes to arrive
- See them pull up, they look worried

Case 1

- 1 yo M, stridorous, slightly pale, moderate retractions
  - Hoarse cry, anxious appearing
  - Temp 38.5 C
  - HR 170
  - O2 93%
  - 10kg

Croup Severity

Clinical feature	Assigned score
Level of consciousness	Normal, including sleep = 0 Disoriented = 5
Cyanosis	None = 0 With agitation = 4 At rest = 5
Stridor	None = 0 With agitation = 1 At rest = 2
Air entry	Normal = 0 Decreased = 1 Markedly decreased = 2
Retractions	None = 0 Mild = 1 Moderate = 2 Severe = 3

Croup Severity

- Moderate: 3-7
- Severe: >8
- LLS score

Case 1 – Croup Management

- Dexamethasone
  - 0.6mg/kg (16mg max)
- Nebulized epinephrine
  - No differences between L- (systemic formulation) and racemic
  - 0.5mg/kg (5mg max)
  - Over 15 minutes
  - Code epi is 1mg/10ml flush
  - Can insert right into nebulizer vial

Croup disposition

- Observe for 3-4 hours
- Normal color and O2 sat
- Tolerating PO
- No stridor at rest, good air exchange
- Reasonable to discharge home

Case 2

- Small NGO hospital in Papua New Guinea
- Grant funding to modernize the facility
- Rotating staff of 8 local docs, all well trained
- While giving a seminar on SGLT-2 use in diabetes, you hear some commotion in the “ER”

Case 2

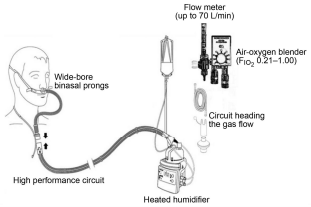
- 65 yo M, respected local elder, ripping off BiPAP and extremely agitated
- Known smoker, presumed COPD, occasional flare
- Covering doc tells you that this seems to be far worse than usual
- HR 120, O2 82%
- What options do you have?

Case 2 – COPD exacerbation

- Current standard:
  - Non-invasive ventilation (or intubation)
    - BiPAP: 8-15 cm H2O / 3 cm H2O
    - Risk of hypercapnia
  - Albuterol 2.5mg nebulized
    - Ipratropium 500mcg often added
  - Prednisone 40mg if able to take PO
    - Methylprednisolone 60-125mg IV if not

Case 2 – COPD

- High flow nasal cannula emerging as first-line treatment



Case 2 - COPD

- High flow functionality
  - Not simply PEEP
  - Adds turbulence to eliminate dead space
  - Mimics how neonates breath
    - 15ml tidal volume with 12ml dead space
  - Improves oxygenation while facilitating CO2 washout
  - Infinitely more tolerable, especially with agitated patients

Case 2 - Resolution

- Showed staff how to use high-flow equipment
- Chief improved dramatically within 5 minutes
- Spent the night in the hospital
- Discharged on levofloxacin and prednisone
- Hosted a dinner in your honor the following week
  - Smoked the entire time

Case 3

- Regional hospital in Uganda
  - 20 beds, three house officers
  - No anesthesia dept.
- Capital city is 7.5 hours away, roads bumpy
- Training trip
- High volume OB, small amount of procedural equipment

Case 3

- 17 yo F, normally healthy
- Working under some farm equipment
  - Holding a small part in her teeth
  - Stuck bolt suddenly loosened
  - Part dropped into throat
- Coughing and severe throat pain ever since
- 45 minutes away

Case 3

- 17 yo F, anxious appearing coughing, but not in distress
  - Normal color and O2 sat
- Vitals are fine
- Xray?

XRAY

Case 3 – Foreign body

- Large bronchi: 60-80% of foreign bodies
  - Dangerous, but you have time
- Small airway: ~10%
  - Not immediately dangerous
- Laryngotracheal: 5-17%
  - Extremely dangerous

Case 3 - Laryngotracheal FB Management

- Intubation meds are supposed to be somewhere
- In the meantime
  - Nebulized lidocaine
  - 4mg/kg (400mg in adults)
- % dosing is grams per 100mL
  - 2% is 2g/100mL
  - 2000mg/100mL
  - 400mg = 20mL of 2% = 10mL of 4% = 4mL of 10%

Case 3 - Laryngotracheal FB Management

- Find 2% solution, nebulize 20mL over 20 mins
- Lay flat, Trendelenburg if tolerated
- Encourage her to slowly breathe through her mouth as much as possible
- Stable, more comfortable appearing
- Take a look?

Case 3 - Laryngotracheal FB Management

- L-scope view

Case 3 - Laryngotracheal FB Management

- No McGill forceps
- Head nurse brings ring forceps from OB department
- Intubation med box is found
- We make an attempt
  - Easily grasp part, monitor for edema over 3-4 hours, discharge to home, the town renames a small side street in our honor
  - Part slips out of the forceps onto cords, blocking airway and causing edema

Emergency Crichothyrotomy

- Rapid Four Step Technique (Bougie assisted variant)
  - Faster than standard technique, with higher success rate
  - Stand at head, like doing an endotracheal intubation
  - Analgesia and sedation to local protocol
  - Aseptic technique
  - #20 scalpel, trach hook (or bougie), trach tube (or modified 5.0 ET tube)

Emergency Crichothyrotomy

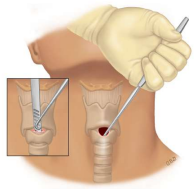
1. Identify and stabilize cricothyroid membrane

Emergency Crichothyrotomy

2. 1-2cm horizontal stab incision through both skin and cricothyroid membrane with #20 scalpel

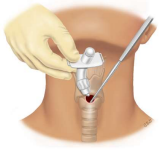
Emergency Crichothyrotomy

3. Keep scalpel in place, pass hook or bougie inferior to blade



Emergency Crichothyrotomy

4. Pass tube
   a) Caudal traction with hook, tube superior to it
   b) Pass bougie 3-4cm, then pass tube over it.



Case 4

- USPHS Officer Deployed to Bahamas after hurricane Dorian
  - Assigned to a Coast Guard SAR team
  - Small airboat, one pilot, two spotters with basic medic training
  - Paramedic bag
  - 7 days after Cat 5 landing
  - Day 4 of neighborhood sweeps
  - Spotter sees a figure on a roof 300 yards away

Case 4

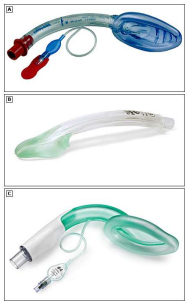
- Pale appearing woman in her 70s
- Laying next to what appears to be a punched out hole in roof
- Groaning, intermittent eye opening
  - GCS 7
  - Agonal breaths
  - Weak pulse
  - Sat 84%

Case 4 – Prehospital Airway

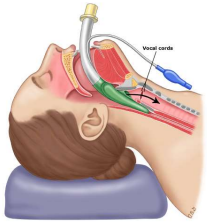
- Quickly load woman on airboat.
  - 35 mins to field hospital.
- Non-rebreather with 100% FIO2 not helping much
- Impending respiratory collapse
- Medic gets 2 IVs
- Options?
  - Intubate
  - Supraglottic airway

Case 4 – Prehospital Airway

- You place a supraglottic device, sats immediately improve
- Pulse remains thready. 3 mins into boat ride, spotter can no longer feel pulse, and sats drop precipitously.
- Begin CPR, what happens with device?
- Supraglottic devices are equivalent, and quite possibly superior* to endotracheal intubation for out of hospital arrest



Case 4 – Prehospital Airway



Case 4 – Prehospital Arrest

- One round of epi, 1L of LR under pressure, you get ROSC
- Remains unresponsive, but pulse persists and sats in mid-90s for the remainder of your trip
- Deliver her to intake team at field hospital
- You received a letter from her last week

Case 5

- Whiteriver Indian Hospital
- Wildfire season, active crews around the clock
- One of two overnight docs covering ER, wards, and OB
- Radio chatter in ER about a Fort Apache Hotshot in distress

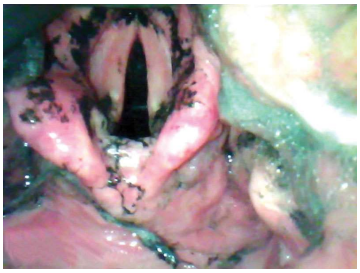
Case 5

- EMS on scene calls to report that they picked up a firefighter at basecamp
- Third shifter on fireline duty got his O2 line caught on a branch
- 10-15 minutes of smoke inhalation as he made his way back to camp
- 10 minutes out

Case 5

- EMS crew arrives
- 28 yo M, sitting up on gurney, no distress, non-rebreather
- BP 132/88, HR 90, O2 90%, RR 16
- Clothing intact, no exposed skin, no burns on face
- Take a look in his mouth, and…

Case 5



Case 5 – Inhalation Injury

- What's next?
  - Prompt intubation, transfer to burn center, run in to him next month at the grocery store
  - Observe in the ER

Case 5 – Inhalation Injury

- Criteria for early intubation
  - Persistent cough, stridor, or wheezing
  - Hoarseness
  - Deep facial or circumferential neck burns
  - Greater than 70% body surface area burns
  - Nares with inflammation or singed hair
  - Carbonaceous sputum or burnt matter in the mouth or nose
  - Blistering or edema of the oropharynx
  - Depressed mental status, including evidence of drug or alcohol use
  - Respiratory distress
  - Hypoxia or hypercapnia
  - Elevated carbon monoxide and/or cyanide levels

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