History of Tracheostomy

- 1546-1st tracheostomy done for upper airway obstruction on adult
- 1620-1st pediatric trach; child with coins lodged in throat
- 1799- George Washington died of upper airway obstruction allegedly because no one wanted to operate on him
- 1808- first tracheostomy on child with Diphtheria
- 1880- first pediatric tracheostomy tube
- 1950-used for acute airway compromise: i.e. diphtheria, croup, epiglottitis/ trach removed when child well
- Vaccines and endotracheal intubation eliminated this need
- 1965- NICU- trachs as result of long-term ventilation
National Incidence
- Relatively infrequent/ about 5000 in US
- 0.07% of all pedi discharges
- 60% male
- Rates highest in youngest and oldest pedi age group

Reasons for tracheostomy
- Infant: congenital, pulmonary/prolonged intubation, prematurity
- 1-9 year old: pulmonary, injury, chronic upper respiratory, large foreign body
- 15-19 year old: injury 77%, pulmonary, neurological

Early Trach Complications
- Local infection
- Accidental decannulation
- Pneumothorax
- Acute hemorrhage
- Death
Late Trach Complications

- Decannulation
- Obstruction
- Subglottic stenosis
- Tracheal fistula/Tracheitis
- Granulation
- Death

Types of trach tubes

- Uncuffed
- Cuffed
- Fenestrated
- T-tube
- Always check size, length and manufacturer; "new" trach sizing; starts at 3.0 neo; custom trachs
Sizing of tube

- Large enough to allow adequate ventilation and small enough to allow laryngeal airflow which will maintain speech
- Small enough to minimize pressure on trachea and stoma
- Neonatal: less than 7kg/ Pedi over 7 kg
- Custom tubes only from company
Sizing
- Tube to extend 2cm below stoma
- No closer than 1-2 cm to carina
- Shorter better
- Better to breathe through and around trach
- All should have universal 15mm adapter for ambu/ metal needs to be fitted
- Poorly fitting tubes hurt....

Material of tube
- Most pedi are silicone or plastic
- Single cannula/ the double narrows ID and increases airway pressure
- Metal tubes in special circumstances
- Bivona: has some metal particles/ need to change prior to MRI

Cuffed vs Uncuffed
- Uncuffed preferable in children
- Cuffed if child on ventilator
- Monitor cuff pressure every shift: balloon inflated means cuff is full
- Use air except Bivona TTS(tight to shaft): check manufacture recommendations
- Mark amount of air
- Don’t overfill/ deflate once a shift for 15” if tolerated
Fenestrated?

- No consensus
- Better translaryngeal airflow
- Aid in secretion removal
- Promote granulation tissue
- Inner cannula needs to be removed for speech but replaced to ventilate with ambu

Trach tube changes

- Best if planned for
- Good to have second person
- Lubricant should be used sparingly
- Never force trach in or out...if you cannot remove trach, child needs to get medical attention
Frequency of tube changes

No consensus
- most common weekly
- more frequent changes may decrease granulation and keep up skills
- cuffed trach repeated change stretches stoma unless Bivona TTS

Duration of tube use

- Inspect before use/ do not use if cracks or tears
- Discard if silastic is stiff
- Manufacturers state life maximum life of tube is 29 days (at least change every 29 days)
- Tube cannot be reused or cleaned due to biofilm development
Cleaning Trach Tubes

- Don’t reuse
- Problems with bacterial biofilm and resistance to cleaning
- Peroxide and detergents do not clean
- Boiling bends tube
- Need new tube with each change

Tracheostomy ties

- Metal beads
- Cotton twill: cheap, easily soiled, need scissors
- Velcro: more expensive, child can pull apart
- Shoelaces: Cheap, check dyes
- Tie snug: one finger
Stoma care

- Inspect
- Keep clean and dry
- Soap and water
- Remove secretions with H2O2
- Avoid: pressure necrosis, routine ointment or creams
- Dressings trap moisture
Suctioning

- Frequency: based on clinical assessment including lung sounds, oxygen need, increase in vent pressure alarms
- Encourage patient to cough first
- Clean technique, use of gloves

- Suction through clean water/ saline after use
- Wipe catheter with alcohol after use
- Air dry and place in clean bag unless child has secretions that prohibit reuse/ only reuse a couple of times/ if cloudy do not use
Technique

- Pressure in infants 60-80 mm Hg
- Premeasure cath with trach tube
- Only to end of trach tube
- Twirl catheter with intermittent suction on insertion and removal
- Less than 5 seconds
- Cath size is largest that fits

Preoxygenation/ Post oxygenation

Use of ambu bag with O2 prior to suctioning if...
- Child with decreased respiratory reserve
- Oxygen drops during suctioning
- Cardiac distress during suctioning
- On supplemental oxygen
Do Not bag if secretions are visible

Use of saline in trach

- Consensus is that routine use of normal saline is not recommended
Humidification

- Inspired air through trach may have humidity deficit
- Consequence of dryness may be deterioration of pulmonary function and increased risk of infection
- Air going into trach needs to be heated and humidified

Types of humidification

- Bubble jet: used in ICU setting/ costly and challenging to manage
- Jet nebulizer: small spray H2O droplets may be heated or at room temperature
- HME: artificial nose/ attaches to trach/ helps child to be more portable
Speech Development

- All children with trach need speech therapy
- Baby sign language for early communication
- Assess child’s hearing
- Use of speaker valve ie Passey-Muir as early as tolerated: thin secretions, person in attendance, deflate cuff
Decannulation

- Decannulate when need for trach is gone and child is able to maintain airway
- Process: smaller trach, cap tube or pull trach?
- Once trach out, child has sensation of air in mouth and can taste food...child may object

Feeding issues

- Oral stimulation
- Oral feeding: different textures and temperatures
- Prepares for speech
- May like very, very spicy foods

Safety/ Child Issues

- Need for play
- Protect trach from small objects
- Child who pulls out trach
- Monitor at all times
Post trach

- May need laryngeal reconstruction
- Better results if done within 25 months of age
- 32% fail first attempt to decannulate

Community Issues

- Why was trach placed...how critical?
- Size? Cuffed?
- Know how to change trach
- Child should travel with all supplies and trach one size smaller
- Travel: HCP card, second person, monitor, seatbelt equipment, cell phone
- Emergency plan...who responds?

School

- Needs one to one nurse door to door: school nurse is backup must know child's care
- Needs specific orders: suctioning, O2
- Needs HCP and emergency plan
- Tutoring plan for absences; starts at day one if child able
- Must attend field trips; parent does not have to go...a nurse must go
Resources

- Pediatric Nursing Skills/ Prentice Hall
- Manufacturer: Shiley booklet
- Aaron’s Tracheostomy Book
- Supporting Students with Special health Care Needs at School