JOSH NAGLER, MD MHPEd
ECHO SERIES
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DISCLOSURES

- I am a paid faculty member for The Difficult Airway Course.
- I write on a number of topics related to pediatric airway management for UpToDate.
OBJECTIVES

At the end of this session participants should be able to:

1. Follow a standardized advanced airway management algorithm
2. Utilize a systematic approach during pediatric endotracheal intubation
3. Recognize and address anatomic and physiologic differences between children and adults when managing the airway
The Main Airway Algorithm

- Needs to Be Intubated?
  - Yes
    - Crash Airway?
      - Yes
        - Intubate w/o Medications
      - No
        - Predicted Difficult Airway?
          - Yes*
            - Difficult Airway Decision
              - High Risk or Low Reward
              - O₂/BMV/NIV
              - Other devices
              - Sedation only
          - No
            - RSI
              - Low Risk or High Reward
              - Post-Intubation Management
                - Successful?
                  - Yes
                  - Failed Airway
                    - No*
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WHY DO WE NEED A SYSTEMATIC APPROACH DURING PEDIATRIC INTUBATION?

1. Infrequent event

2. “Pediatric” = lots of things

Intubations per 1000 patients

6-10

1-2
MEMORY, MNEMONICS, FORMULAS, ETC.

- Weights for age
- Endotracheal tube size
- Insertion depth
- Dosing of medication
LESSENING THE COGNITIVE LOAD:
LENGTH-BASED SYSTEMS
LESSENING THE COGNITIVE LOAD: THERE’S AN APP FOR THAT
CHECKLISTS CAN HELP

BCH ED Pre-Intubation Checklist

Attending in charge reads aloud each item:

Providers

- Identify by name each person:
  - Primary laryngoscopist
  - Backup laryngoscopist – positioned to see video screen
  - RN administering meds
  - Other personnel: Respiratory therapy and pharmacist

Airway

- Discuss any airway concerns
  - If difficult airway, call 5-5555 for anesthesia STAT (run!) or ALERT (walk)
  - For critical airway obstruction: call 5-5555 for ORL STAT (includes ANESTH)
  - Consider having LMA available (in trauma pyx)

Patient

- Pre-oxygenate for ≥ 2 -3 mins with 100% FiO2
- Apneic oxygenation suggested - NC (not ETCO₂ cannula) at 1-2L/min/year of age
- Discuss any possible hemodynamic issues
  - Consider NF bolus, starting pressors, placing defibrillator pads
- Discuss preparations for any other special situations?
  - C-spine immobilized - Consider pediatric (2-12 yrs) or adult (>12 yrs) D blade
  - Head injury precautions
  - Distended stomach requiring venting

Equipment

- Ensure that all of the following equipment is present and functioning:
  - Suction - flexible suction catheter and Yankauer
  - Oxygen - NRB, bag and mask
  - Airway equipment
    - 2 laryngoscopes - primary and back up
    - 2 ETTs - appropriate size and 1 smaller (test the cuff)
    - Note and/or mark tube insertion depth (3x tube diameter)
  - Oral airways
  - Benzoin and tape
  - Pharmacology
    - Pretreatment: Atropine (0.02 mg/kg) if < 1 yo or bradycardic
    - RSI Meds – state names and doses of meds
    - Sugammadex 16 mg/kg in room if need for Rocuronium reversal
    - Post-intubation anesthesia
  - Equipment
    - In-line ETCO₂
    - Ventilator
- Push record on VL
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ANATOMIC DIFFERENCES

Relatively Large Occiput
TRAGUS (EXT AUDITORY CANAL) → SHOULDER
HEAD VS. SHOULDER ROLL BASED ON AGE
Historically pediatric airway reported as “funnel shaped”

(Coté CJ, Ryan JF, Todres ID, et al [eds]: A Practice of Anesthesia for Infants and Children, 1992.)
NOT-SO-FUNNEL-SHAPED AIRWAY

- Newer data
  - MRI images
  - Bronchoscopy
  - CT

MRI

3D-CT

Bronchoscopy

(Litman RS et al. Anesthesiology, 2003)

(Wani TM et al. Paediatr Anaesth, 2017)

(Dalal PG et al, Anesth Analg, 2009)
WHY UNCUFFED TUBES?

1. “Funnel” shaped → naturally snug fit
2. Means need smaller tube
3. Concern for tracheal injury
PHYSIOLOGIC DIFFERENCE

Rapid Desaturation

- Higher oxygen consumption
- Lower oxygen reserve

### PREDICTABLE DIFFERENCES IN PEDIATRIC AIRWAYS AND HOW TO ADDRESS THEM

<table>
<thead>
<tr>
<th>Anatomic/Physiologic Challenge</th>
<th>How Best to Address</th>
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</thead>
<tbody>
<tr>
<td>Large occiput</td>
<td>Position patient (line up the tragus)</td>
</tr>
<tr>
<td>Airway shape (not funneled)</td>
<td>Consider cuffed endotracheal tubes</td>
</tr>
<tr>
<td>Rapid desaturation</td>
<td>Pre-oxygenation Apneic oxygenation</td>
</tr>
</tbody>
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QUESTIONS, THOUGHTS, IDEAS?