Yukon-Kuskokwim HEALTH CORPORATION

Clinical Guideline

Intubation (Adult and Pediatric)

Prepare

Predict difficult airway and post-intubation hypotension (See below for Push-Dose Epinephrine):
1. Shock Index (SI) = HR/sBP. If >0.8, high likelihood of post-intubation hypotension. Optimize resuscitation with fluids/blood prior to intubation if possible.
2. Have at bedside: BVM with correct size mask, OPA/NPA, suction, LMA/i-Gel, bougie, push-dose epinephrine (see below).
3. Predictors of difficult intubation: see next page. ***Consider contacting anesthesiology if difficult airway is anticipated!***
4. Prepare several doses of all medications, including an extra dose of paralytic and boluses of post-intubation sedation.
5. Optimize positioning: shoulder roll for infants and children, ramp positioning for obese patients.

Pre-oxygenate

Goal SpO_2 > 93% for three minutes. Mask *and* NC in all patients.
Non-rebreather with flush rate O_2 if spontaneously breathing.
Bag-mask ventilation if no spontaneous breathing.
Non-invasive PPV if in ARDS.

PUSH-DOSE EPINEPHRINE
- Mix 9 mL of NS with 1 mL of epinephrine 1:10,000 (or 0.1 mg/mL) to make epinephrine 10 mcg/mL.
- Adult dose is 0.5-2 mL Q 2-5 minutes (5-20 mcg).
- Pediatric dose is 0.1 mL/kg, max 2 mL.

Pre-medicate (optional)

ADULTS, may choose one or more:
1. Fentanyl 2 mcg/kg
2. Ketamine 0.1-0.3 mg/kg
3. Rocuronium 0.1 mg/kg

PEDIATRICS:
Atropine – onset <1 minute. Use for <1 year or if using ketamine. Use doses on Pediatric Critical Care Guide (code sheets).
Consider using in any patient at risk for bradycardia associated with airway manipulation, shock, hypoxia, acidosis, or severe electrolyte abnormalities.

Induce

ADULTS, choose one agent. Reduce doses if risk of hypotension.
1. Etomidate 0.3 mg/kg: first line for most patients.
2. Ketamine 1-2 mg/kg.
3. Propofol 2 mg/kg.
4. Midazolam 0.1-0.3 mg/kg.

PEDIATRICS:
Midazolam AND fentanyl, using doses on Pediatric Critical Care Guide (code sheets).
May need to repeat fentanyl dose.

Paralyze

ADULTS, choose one:
1. Rocuronium 1-2 mg/kg: duration 30-40 minutes.
2. Succinylcholine 1-2 mg/kg: duration 3-5 minutes; see warning on next page.
3. Vecuronium 0.1 mg/kg: duration 45-65 minutes.

PEDIATRICS:
Rocuronium, using doses on Pediatric Critical Care Guide (code sheets).
DO NOT USE SUCCINYLCHOLINE.

Perform video or direct laryngoscopy

Fails → **Bag-mask ventilation ± OPA or supraglottic airway (LMA/i-Gel)**

Succeeds → Consider making changes:
- Try other form of laryngoscopy, including intubating bronchoscopy.
- Change provider doing the procedure.
- Contact anesthesia.
- Change patient position.
- Use bougie.

Fails → **Cricothyrotomy**

Succeeds

Succeeds

PEDIATRICS:
- Secure tube with silk tape.
- Do not use a commercial tube holder device for tubes 5.0 and smaller.
- Always place NG/OG tube for decompression.
- Cricothyrotomy should be avoided in <10 years unless absolutely no other options.
- Pre-oxygenate for full two minutes between attempts.

Confirm placement:
1. Visualize tube through cords.
2. End tidal CO2 detector turns and remains yellow after 6 breaths.
3. Bilateral breath sounds.
4. No noise over epigastrium.
5. *Normal waveform on $EtCO_2$ capnography (gold standard).*
6. Confirmation on CXR.

Continuing sedation/analgesia

ADULTS:
1. Fentanyl 1-4 mcg/kg/hour, bolus 50-100 mcg.
2. Midazolam 0.02-0.1 mg/kg/hour, bolus 1-5 mg.
3. Propofol 5-80 mcg/kg/minute, bolus 1-2 mg/kg.
4. Ketamine 0.5 mg/kg/hour, bolus 1-2 mg/kg.

PEDIATRICS:
- Fentanyl continuous infusion with boluses Q15minutes *prn*, using doses on Critical Care Guide. Give bolus prior to starting drip.
- Consider midazolam boluses if needed. Consider continuous infusion if needed. Watch for hypotension.

Post-intubation care

- Obtain ABG.
- Place NG/OG tube.
- Elevate head of bed 30-45°.
- BP Q3 minutes x30 minutes.
- Place in-line suction.
- Consider nebulized treatments.
- Consider C-collar.

This guideline is designed for the general use of most patients but may need to be adapted to meet the special needs of a specific patient as determined by the medical practitioner.
Approved by Clinical Guideline Committee 3/11/24.
Click here to see the supplemental resources for this guideline.
If comments about this guideline, please contact Travis_Nelson@ykhc.org or Leslie_Herrmann@ykhc.org.

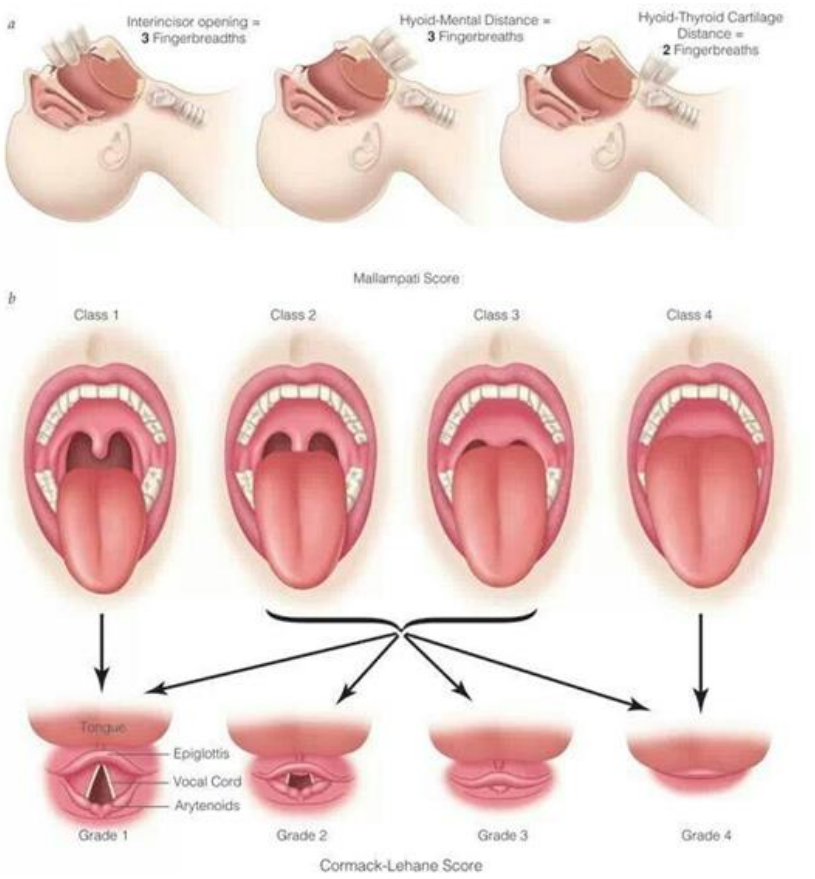
Yukon-Kuskokwim HEALTH CORPORATION

Clinical Guideline
Intubation (Adult and Pediatric)

Predictors of Difficult Intubation

Predictors of Difficult Intubation

- Mallampati grade 3 or 4
- Cormack & Lehane grade 3 or 4
- Wilson score of > 2
- LEMON system; objective/subjective scoring



Wilson Score			
	0	**1**	**2**
Weight (kg)	< 90	90-110	> 110
Head and neck movement	> 90°	~ 90°	< 90°
• Inter-incisor gap (cm) • SL (maximum forward protrusion of lower incisors beyond uppers)	> 5 > 0	= 5 = 0	< 5 < 0
Receding mandible	None	Moderate	Severe
Buck teeth	None	Moderate	Severe

LEMON System	
L	**L**ook: trauma, large tongue
E	**E**valuate 3:3:2 rule.
M	**M**allampati score ≥3
O	**O**bstruction
N	**N**eck mobility (limited)

Helpful Resource: **the Difficult Airway App**

Difficulty with BVM

Predictors of Difficulty with BVM	
R	**R**adiation/**R**estriction
O	**O**bstruction/**O**besity/**O**SA
M	**M**ask seal/**M**ale/**M**allampati ≥3
A	**A**ged
N	**N**o teeth

Options if having difficulty with BVM

- 2-hand technique with 2 providers
- Oral/nasal airways
- Positioning
- Consider no paralytics

Paralytics

Succinylcholine

Absolute contraindications:
- Family / personal history of malignant hyperthermia
- Hyperkalemia; if unknown K, obtain EKG for peaked T's
- Upper motor neuron injury, denerving neuromuscular disease
- Use after acute phase of burns, major trauma, crush injury

Relative contraindications:
- Elevated ICP
- Pseudocholinesterase deficiency

Treatment of malignant hyperthermia:
- Dantrolene 2.5 mg/kg IV, redosing based on expert guidance

Avoid in pediatric patients.

Rocuronium

Note: Incidence of rocuronium IgE-induced anaphylaxis is estimated at 1:2500. Consider if sudden cardiovascular collapse after giving rocuronium.

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Resources: Guideline adapted from Strayer Airway Algorithm, Austin Hospital Airway Algorithm, Difficult Airway Course
Predictors of Difficult Intubation: http://medind.nic.in/iad/t05/i4/iadt05i4p257.pdf

Yukon-Kuskokwim HEALTH CORPORATION

Clinical Guideline
Initial Ventilator Settings

ADULTS: ARDS/Protective Ventilation Protocol (appropriate for most patients without indication for alternate ventilation)

Initial Ventilator Settings:

1. Set Tidal volume (Vt) = 6-8 mL/kg using Ideal Body Weight. See MDCalc Tidal Volume Calculator.
2. Reduce Vt by 1 mL/kg every 1-2 hours until Vt 6 mL/kg.
3. Set initial rate to 18-35 bpm based on pre-intubation rate.
   Obstructive lung disease: Consider lower RR to maximize expiratory phase.
4. Set initial PEEP at 5 cm H2O.
   - If BMI > 30, set PEEP to 8 cm H2O.
   - If BMI > 40, set PEEP to 10 cm H2O.
5. Set initial FiO2 at 30-40%; adjust to SpO2 88-95%.
6. Set inspiratory flow rate 60-80 lpm.
   Obstructive lung disease: Consider inspiratory flow rate 80-100 lpm

Check BP immediately after any major changes in vent settings.

Adjust settings based on patient status, blood gases, CXR, and expert consultation.

Oxygenation goal: PaO_2 55-80 mmHg or SpO_2 88-95%.
Use a minimum PEEP of 5 cm H_2O. Consider use of incremental FiO_2/PEEP combinations such as shown below (not required) to achieve goal.

PEDIATRICS: Suggested Starting Ventilator Settings

1. Set FiO_2 to 1.0 and titrate to maintain SpO_2 92-94%. Goal is to decrease FiO_2 to <0.5 if possible.
2. Set Tidal Volume (Vt) at 8-10 mL/kg. If concern for ARDS, set Vt to 6-8 mL/kg.
3. Goal is inspiratory plateau pressures <30 cm H_2O.
4. Set respiratory rate by age, increasing or decreasing based on disease process:
   Adolescents 12-15 breaths/minute
   Children 15-20 breaths/minute
   Infants 20-25 breaths/minute
   Neonates 25-30 breaths/minute
5. Set PEEP to 5 cm H_2O to optimize alveolar recruitment.
6. Set inspiratory time by age:
   Adolescents 1.0 second
   Children 0.7 second
   Infants/neonates 0.5 second
7. If using pressure support, set at 5-10 cm H_2O.
8. Get a blood gas ~30 minutes after any changes to ventilator settings.

Check BP immediately after any major changes in vent settings.

Call PICU at (907) 297-8809 immediately to help troubleshoot any problems. Low threshold to use Zoom.

For All Modes of Ventilation

- Initial vent setting are based on patient presentation.
- Vent settings are adjusted based on patient tolerance of mechanical ventilation and ABG results.
  For high PCO_2: increase rate and Tidal Volume
  For low PO_2: increase FiO_2 and PEEP
- Obtain ABG prior to intubation, 30 minutes following intubation, and 30 minutes after vent changes.
- Goal plateau pressure < 30 cm H_2O; decrease Vt to lower plateau pressure.
  Obese patients may require higher plateau pressure.
- Target pH > 7.30; increase RR to control hypercapnia.
- Avoid intubation if possible in patients with obstructive lung disease; maximize use of NIPPV.

Check BP immediately after any major changes in vent settings.

Extubation

If considering extubation in the Emergency Department, see **this algorithm** and **this resource**.

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