Kittitas County Prehospital Care Protocols

Subject: ADVANCED AIRWAY MANAGEMENT

A. Advanced Airway Management shall be considered for all patients meeting the following criteria:
    1. Patients unable to oxygenate (unable to maintain saturations above 90% through noninvasive means)
    2. Patients unable to ventilate (unable to maintain adequate rate or volume, GCS less than 8)
    3. Patients with poor predicted clinical course (inhalation injuries, severe anaphylaxis, traumatic brain injuries, etc.)

B. All patients who qualify for Advanced Airway Management shall be evaluated and categorized by their clinical presentation and hemodynamics. The patient will be placed in one of the following categories/algorithms:
    1. **Crash Airway –** Cardiac Arrest
    2. **Rapid Sequence Intubation –**
        a. Patients who maintain SPO2 of 95% for 3 minutes or more with noninvasive means
        b. Imminent airway failure: rapidly expanding airway edema (burns, anaphylaxis), copious amounts of fluid, etc.
    3. **Delayed Sequence Intubation -**
        a. Patient's mental state is preventing adequate oxygenation (i.e., agitation)
        b. Patient's clinical presentation requires need for resuscitation:
            i. Oxygenation
            ii. Ventilation
            iii. Blood Pressure

Pre-Intubation Preparation for RSI/DSI Procedures:

C. A complete set of vitals to include blood pressure, respiratory rate, blood glucose, Spo2, ETCO2 and 4-Lead EKG shall be obtained prior to any advanced airway procedure.

D. Evaluate the patient's anatomy for anticipated difficult airway management (M.O.A.N.S, L.E.M.O.N.S).

E. Prior to beginning any advanced airway procedure, ready all the following equipment and supplies:

1. Bag-valve-mask (BVM) and nasal cannula with functioning supplemental oxygen system.
2. Suction unit with rigid pharyngeal tip.
3. OPA and NPA airway adjuncts.
4. Laryngoscope and endotracheal tubes.
5. "Bougie" tube introducer
6. Rocuronium and Succinylcholine
7. Etomidate and Ketamine (for initial induction and continued sedation).
8. Supraglottic Airway Device
9. Cricothyrotomy Kit

Airway Algorithm Selection

F. The appropriate airway algorithm will be selected based on objective findings from the patient's hemodynamic and airway assessments.

G. **Crash Airway –** Any patient identified to be in cardiac arrest. No need for routine pharmacology assisted intubation. Follow current AHA/High Performance CPR recommendations emphasizing successful oxygenation and ventilation over endotracheal tube placement.

1. Apneic Oxygenation – A nasal cannula with high flow oxygen shall be placed with ongoing CPR compressions.
2. Direct or video laryngoscopy should be performed within the first 5 minutes of the resuscitation attempt. If visualization of the vocal cords is not immediately obtained and an endotracheal tube cannot be placed in the first attempt, the provider will place a supraglottic airway device.

H. **Rapid Sequence Intubation –** Patient has met the criteria of either maintaining oxygen saturations ≥95% for ≥ 3 minutes with noninvasive means *OR* is in danger of imminent airway failure due to airway swelling or copious amount of fluid.

1. Ensure that a functioning IV/IO line is in place.
2. Position the patient as to allow for optimal pre-oxygenation, ventilation, and unobstructed view for direct or video laryngoscopy (sniffing position, ramping, etc.)
3. Pre-oxygenate the patient with 100% supplemental oxygen to allow for complete oxygen saturation and nitrogen "washout."
    a. A nasal cannula shall be placed at 15 liters per minute to supplement all preoxygenation procedures and prepare for apneic oxygenation of the patient.

b. Based on clinical presentation, patient shall be preoxygenated with high flow oxygen by non-rebreather mask, C-PAP or BVM device with a target Spo2 of 95% or greater for 3 minutes.

4. Proper induction is required for sedation and amnesia in the conscious patient who requires intubation or placement of a Supraglottic Airway Device. The paramedic will choose **ONE** of the following medications to achieve adequate sedation and amnesia:
    a. **Ketamine** 2.0mg/kg, IV or IO
    b. **Etomidate** 0.3mg/kg IV or IO

5. To achieve complete relaxation of the patient, a neuromuscular blocking agent shall be administered:
    a. **Rocuronium** 1.0mg/kg IV or IO
    b. **Succinylcholine** 1.5mg/kg for adults, 2.0mg/kg for pediatrics IV or IO

6. Perform direct or video laryngoscopy and place an endotracheal tube per protocol.
    a. Oxygen saturations shall be maintained above 90% between each intubation attempt.
    b. If relaxation is inadequate, administer additional ½ dose of the original neuromuscular blocking agent chosen.
    c. If bradycardia occurs during the intubation attempt, cease intubation efforts and place a supraglottic airway device.
    d. If endotracheal intubation cannot be achieved after 3 attempts, move rapidly to the placement of a supraglottic airway device or quality BVM ventilations.
    e. If supraglottic airway placement or BVM ventilations are unsuccessful at oxygenation or ventilation, move to needle or surgical cricothyrotomy.

I. **Delayed Sequence Intubation -** Patient's clinical presentation requires the need of resuscitation prior to intubation in order to prevent peri intubation cardiac arrest or hypoxemia ***OR*** the patient's agitated mental state is preventing adequate oxygenation or ventilation.

1. Ensure that a functioning IV/IO line is in place.
2. Proper induction is required for the sedation and amnesia of the Delayed Sequence Intubation patient. The paramedic should administer **Ketamine** 2.0mg/kg slow push over 1 minute.
3. Position the patient as to allow for optimal pre-oxygenation, ventilation and unobstructed view for direct or video laryngoscopy (sniffing position, ramping, etc.)

4. Preoxygenate that patient with 100% supplemental oxygen to allow for complete oxygen saturation and nitrogen "washout."

a. A nasal cannula shall be placed at 15 liters per minute to supplement all preoxygenation procedures and prepare for apneic oxygenation of the patient.
b. Based on clinical presentation, patient shall be preoxygenated with high flow oxygen by non-rebreather mask, C-PAP or BVM device with a target Spo2 of 95% or greater for 3 minutes.

5. Patients who are hemodynamically unstable shall be resuscitated prior to any intubation attempt:
    a. Any noted hypotension will be corrected with either a 500cc fluid bolus or vasopressor infusion.
    b. For persistent hypotension with signs of poor perfusion, consider push dose epinephrine of 5-10mcg.

6. To achieve complete relaxation of the patient, a neuromuscular blocking agent shall be administered:
    a. **Rocuronium** 1.0mg/kg IV or IO
    b. **Succinylcholine** 1.5mg/kg for adults, 2.0mg/kg for pediatrics IV or IO

7. Perform direct or video laryngoscopy and place an endotracheal tube per protocol.
    a. Oxygen saturations shall be maintained above 90% between each intubation attempt.
    b. If relaxation is inadequate, administer additional ½ dose of the original neuromuscular blocking agent chosen.
    c. If bradycardia occurs during the intubation attempt, cease intubation efforts and place a supraglottic airway device.
    d. If endotracheal intubation cannot be achieved after 3 attempts, move rapidly to the placement of a supraglottic airway device or quality BVM ventilations.
    e. If supraglottic airway placement or BVM ventilations are unsuccessful at oxygenation or ventilation, move to needle or surgical cricothyrotomy.

Post Intubation Management

J. Confirm the proper placement of the endotracheal tube or Supraglottic Airway Device:
    1. Note direct visualization of tube passing through vocal cords, if possible.
    2. Confirm bilateral lung sounds and no noted epigastric sounds.
    3. Obtain waveform AND numeric ETCO2 reading from the cardiac monitor.
    4. Reassess vital signs to include blood pressure, Spo2 and heart rate.

K. Continued sedation and amnesia will be administered to ensure patient comfort:

1. **Ketamine** 2.0mg/kg IV or IO ***NOTE:** If Ketamine is chosen for continued sedation, consider additional administration of Versed to reduce the probability of an emergence reaction.**
2. **Versed** 2.5-5mg, up to 0.1mg/kg IV or IO. ***NOTE:** Patients must have a systolic BP > 100mmHg to administer. Recheck blood pressure 5 minutes after administration.**

L. Pain management will be considered in addition to sedation to ensure patient comfort:
   1. **Fentanyl** 25-50mcg, IV or IO. ***NOTE:** Patients must have a systolic BP > 100mmHg to administer. Recheck blood pressure 5 minutes after administration.*
   2. **Morphine** 2.0mg, IV or IO. ***NOTE:** Patients must have a systolic BP > 100mmHg to administer. Recheck blood pressure 5 minutes after administration.*

M. For patients that are combative and continue to struggle despite attempts at continued sedation and pain management, consider continued use of one of the following neuromuscular blocking agents to prevent the airway from becoming displaced:
   1. **Rocuronium** 1.0mg/kg IV or IO
   2. **Vecuronium** 0.1mg/kg IV or IO

Contaminated Airway Management

N. When the hypopharynx and/or airway is contaminated with blood or emesis, visualization and successful intubation may become more difficult. The following techniques may be used to help manage the contaminated airway:
   1. **SALAD (Suction Assisted Laryngoscopy and Decontamination)**
      a. While placing the laryngoscope or video scope, use the rigid suction tip to suction ahead of the blade to begin to remove contamination from the airway.
      b. Suction around the glottic opening and vocal cords.
      c. Place and leave the rigid suction tip in the esophagus to allow for continued suctioning during the intubation attempt.
      d. Once the endotracheal tube has been successfully placed and the cuff has been inflated, remove the rigid suction tip from the esophagus.
      e. Place a French "soft tip" catheter to suction the endotracheal tube as needed.

   2. **SAACI (Suction Assisted Airway Catheter Insertion)** **NOTE – This technique *requires* either a "DuCantor" or "Hi-D" rigid suction tip catheter and is NOT possible with a traditional rigid Yankauer tip catheter.**
      a. With a Ducantor or Hi-D rigid suction tip, perform the "SALAD" technique.
      b. With visualization of the vocal cords, place the rigid suction tip into the glottic opening.
      c. Disconnect the suction tubing while leaving the rigid tip in the glottic opening.
      d. Cannulate the rigid tip catheter with a "bougie."

e. Remove the rigid tip catheter and reconnect to the suction tubing.
f. Perform the "SALAD" technique, placing and leaving rigid tip catheter in the esophagus.
g. Thread the appropriately sized endotracheal tube over the bougie device and through the vocal cords.
h. Once the cuff has been inflated and the bougie has been removed, remove the rigid tip catheter from the esophagus.
i. Place a French "soft tip" catheter to suction the endotracheal tube as needed.

Special Considerations

Cardiac Arrest

1. Primary use of a supraglottic airway is an acceptable means to manage the airway and ventilation for a patient in cardiac arrest.
2. If a supraglottic airway is not maintaining adequate ETCO2 waveform, remove the device and intubate.
3. Prior to ceasing resuscitation efforts, consider removing the supraglottic airway device and intubate to confirm accurate ETCO2 levels.
4. Upon Return of Spontaneous Circulation, the paramedic may choose to remove the Supraglottic Airway Device in favor of placing a definitive airway with an endotracheal tube.

Pharmacological Selection

1. In patients with hypotension/hypovolemia:
    a. Dosing of the induction and paralytic agents should be adjusted to account for the patient's unstable blood pressure – **HALF** of the normal dose for induction agents and **DOUBLE** the normal dose of paralytic agents is suggested.

2. *Ketamine* is the preferred induction agent in patients presenting with:
    a. Hypotension/Hypovolemia
    b. Reactive Airway Disease and Restrictive Lung Disease processes
    c. Sepsis and Metabolic Acidosis

3. *Etomidate* is the preferred induction agent in patients presenting with:
    a. Severe Hypertension

4. *Rocuronium* should be considered the preferred neuromuscular blocking agent for the majority of RSI/DSI procedures due to the absence of contraindications and documented incidences of prolonged "safe apnea" times.

5. *Succinylcholine* is **contraindicated** for use in the following situations and Rocuronium will be used as the primary neuromuscular blocking agent:
    - **a.** Patients with suspected hyperkalemia (renal failure, missed dialysis appointments, etc.)
    - **b.** Patients who have sustained significant burns or crush injuries (until the time healing is completed.)
    - **c.** Patients with sepsis
    - **d.** Patients with suspected traumatic brain injury or spinal cord injury.
    - **e.** Patients who have suffered severe stroke (until at least 6 months past the event).
    - **f.** Patients with Neuromuscular diseases such as Multiple Sclerosis or Muscular Dystrophy

Equipment

1. For all adult patients, use child BVM w/adult mask or small adult size bag (not ≥1000 ml = stroke volume 450-725 ml = one/two handed) with appropriate adult size mask. The target volume for a full-sized adult is 450 ml.

Influenza Like Illness – ILI

1. Perform procedures away from the contaminated environment and bystanders whenever possible (outdoors, in the MICU with back doors and windows open and HVAC in the driver's compartment on high.)
2. Use HEPA filters on all airway management procedures that may produce infectious aerosolized droplets.
3. Placing a mask or draping a towel over open ports of devices or BVMs while bagging may also reduce aerosolization.
4. When not in use, place a golf tee or cover the proximal end of the gastric suctioning port of the iGel Supraglottic Device

Metabolic Acidosis

If a patient is suspected of having an underlying metabolic acidosis (aspirin overdose, tricyclic antidepressant overdose, sepsis, diabetic ketoacidosis, etc.) post intubation ventilation rates and ETCO2 will be made to match the patient's pre-intubation values to prevent severe acidosis by overriding the patient's natural compensatory mechanisms.

Note:

LEMON = Look externally, evaluate, Mallampati score, obesity/obstruction, neck mobility

MOANS = Mask seal, obesity/obstruction, age, no teeth, sleep apnea/stiff lungs