

Pharmacological Assisted Intubation (P.A.I.)

Revised 2023 per NWA Protocols

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Pharmacological Assisted Intubation

- ❑ Securing and maintaining an airway is a provider's highest priority when caring for critically ill or injured patients.
- ❑ When required, advanced airway interventions must be performed quickly and efficiently by an experienced individual with the goal of establishing a definitive airway while minimizing any possible complications.

This class will discuss:

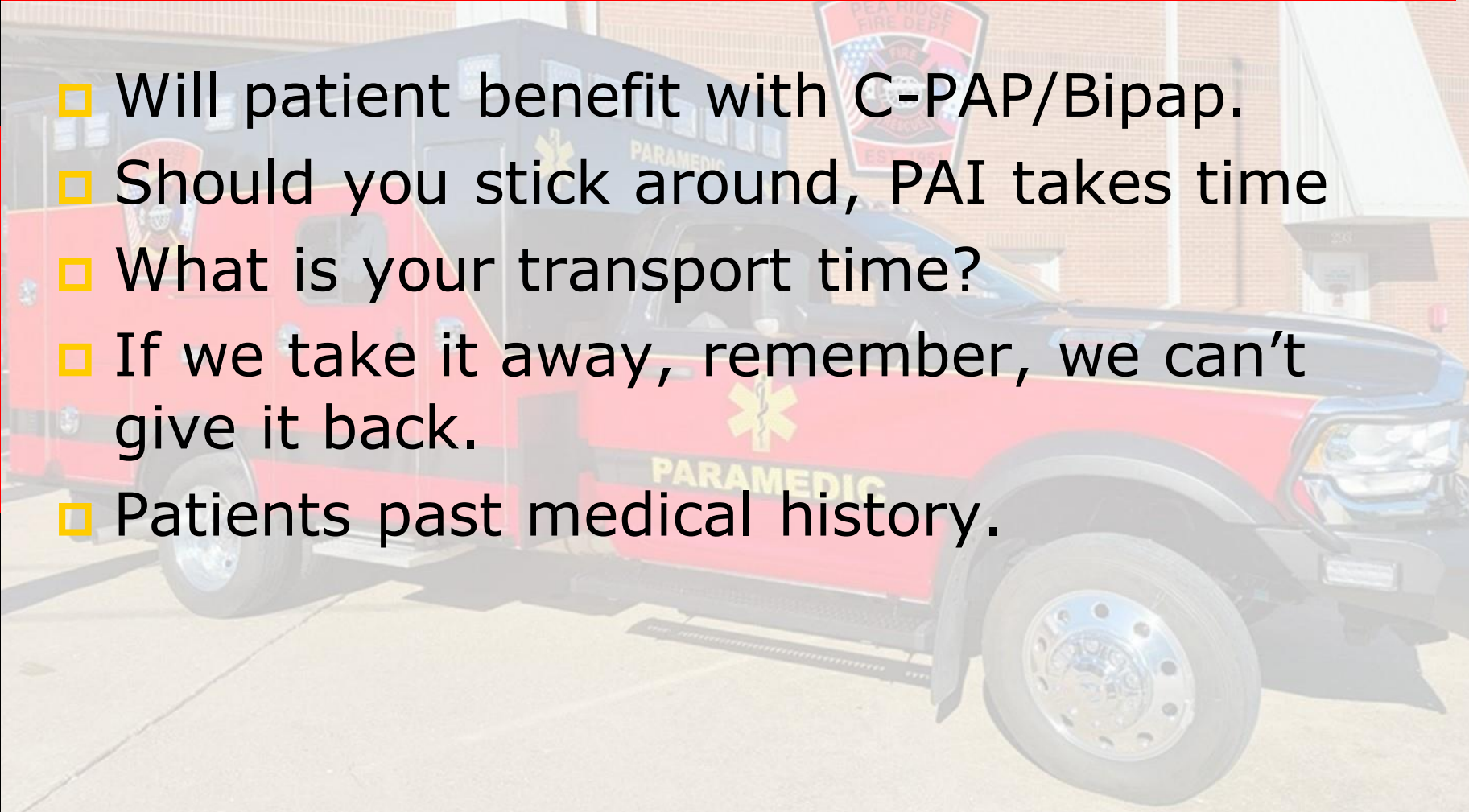
- ❑ The recognition of airway compromise and management
- ❑ The proper use of PAI medications
- ❑ Clinical skills
- ❑ The goal of developing confidence and competence to successfully and safely perform his/her role in the PAI process in the pre hospital setting.

The first step

- ❑ Decide whether you are ready to take on the added responsibility of performing a PAI
- ❑ Are you completely comfortable with your basic airway and backup airway skills or do you need more time to develop them?
- ❑ Are you intimately familiar with the back up airways?
- ❑ If not, then performing a P.A.I is not for you.....Yet!

Is PAI the right choice

- ❑ Will patient benefit with C-PAP/Bipap.
- ❑ Should you stick around, PAI takes time
- ❑ What is your transport time?
- ❑ If we take it away, remember, we can't give it back.
- ❑ Patients past medical history.



Clinical “Triggers” for PAI

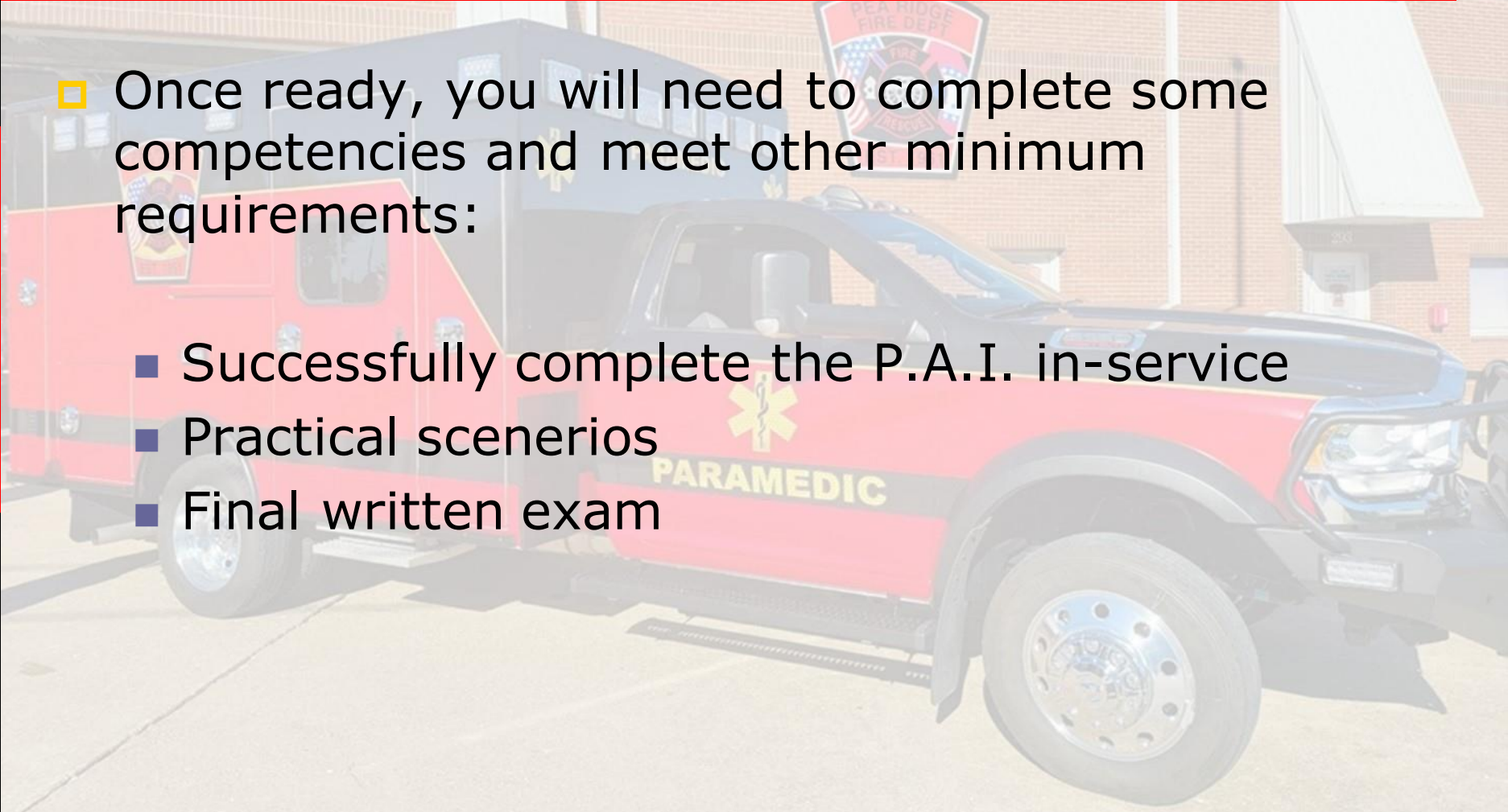
- Maintenance and protection.
- - Can they talk? Can they swallow?
- Questionable breathing w/vomiting present
- - Aspiration chances?
- - Vomiting w/aspiration carries about a 70% mortality rate.
- It takes roughly the same amount of time for a patient to get from 100-90% as it does to get from 90-0%.

Clinical Triggers

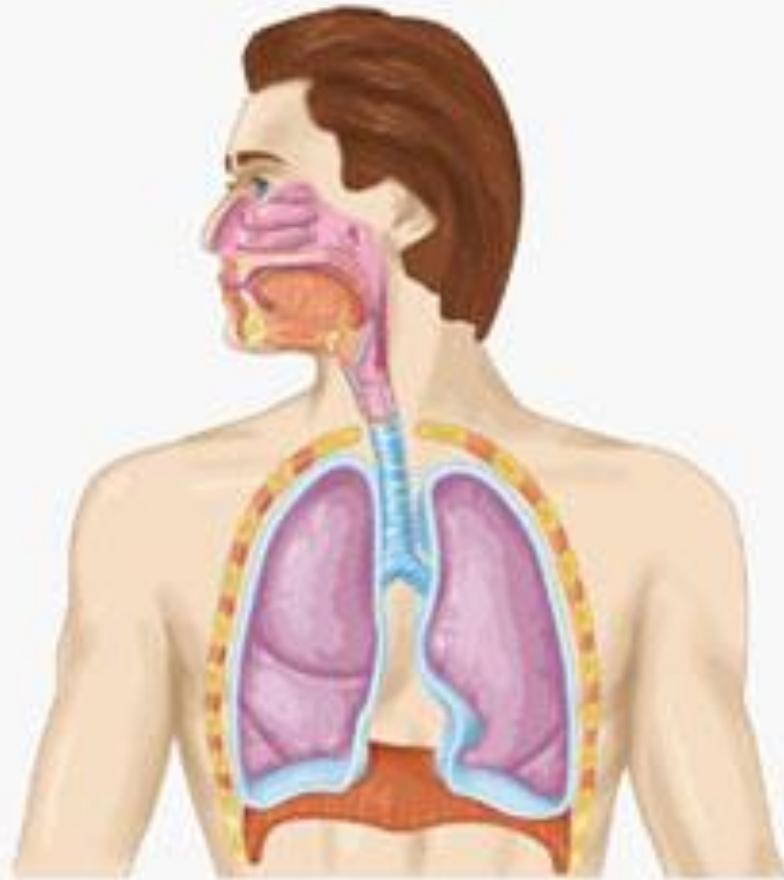
- ❑ Labored and fatigued respirations.
- ❑ - How long do you think patient can continue?
- ❑ - Respiratory arrest imminent?
- ❑ TBI
- ❑ - Trauma with associated ALOC or combative behavior?

Training

- Once ready, you will need to complete some competencies and meet other minimum requirements:
 - Successfully complete the P.A.I. in-service
 - Practical scenerios
 - Final written exam



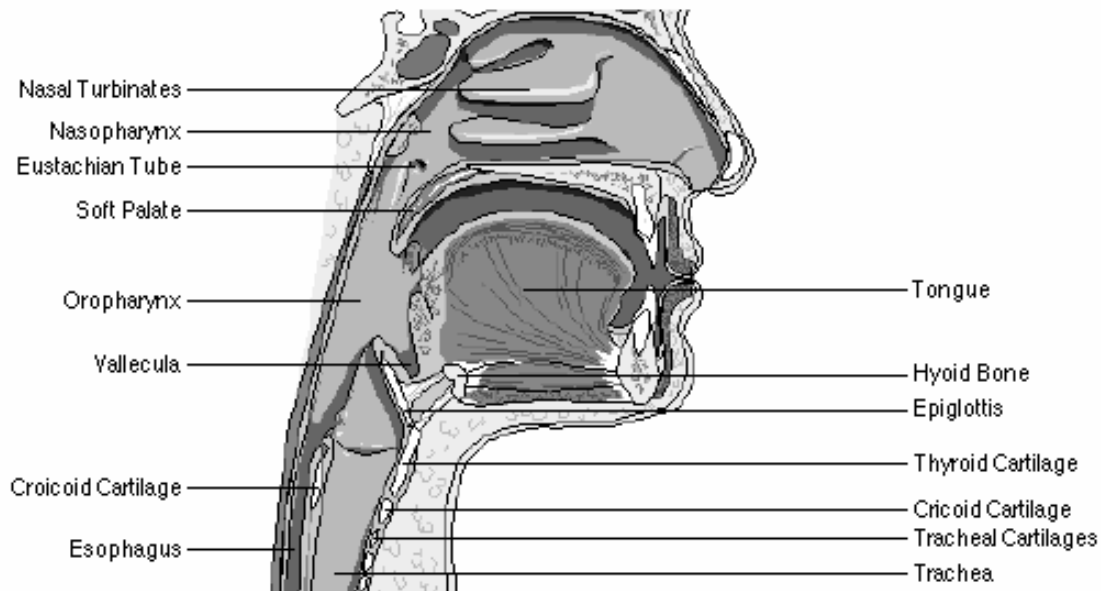
Basic Anatomy of the Airway



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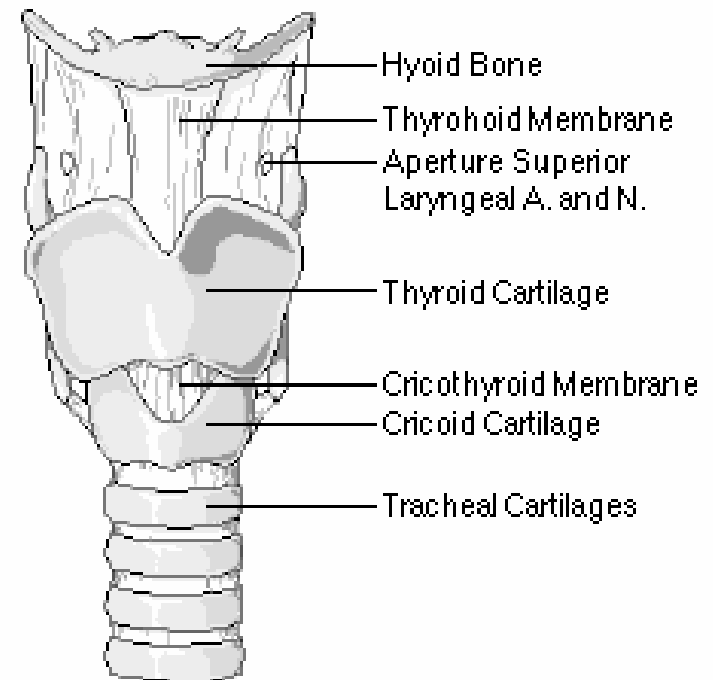
Upper Airway

- The face and the facial skeleton are considered components of upper the airway. The upper airway heats, humidifies and conducts air into the lower airways. Problems can arise from obstructions, fractures and soft tissue injuries.



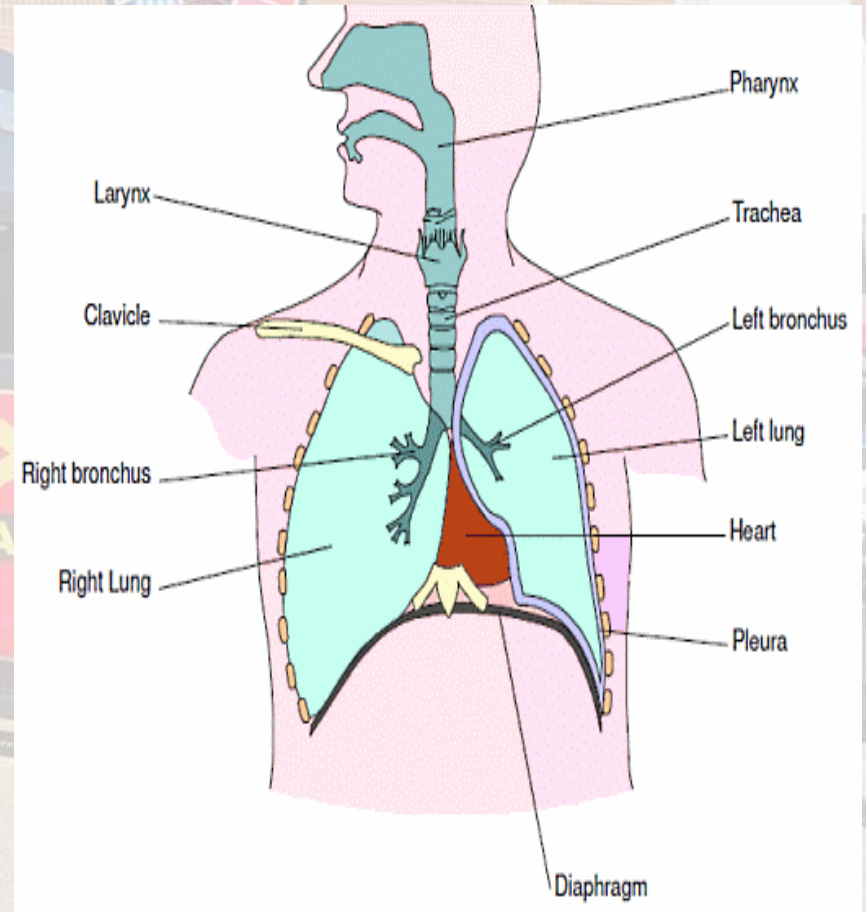
Middle Airway

- The middle airway consists primarily of the larynx. It is fairly well protected but is susceptible to injury. The larynx is comprised of cartilage and contains the vocal cords. Because it is narrow, edema, secretions, or foreign bodies can quickly cause problems.



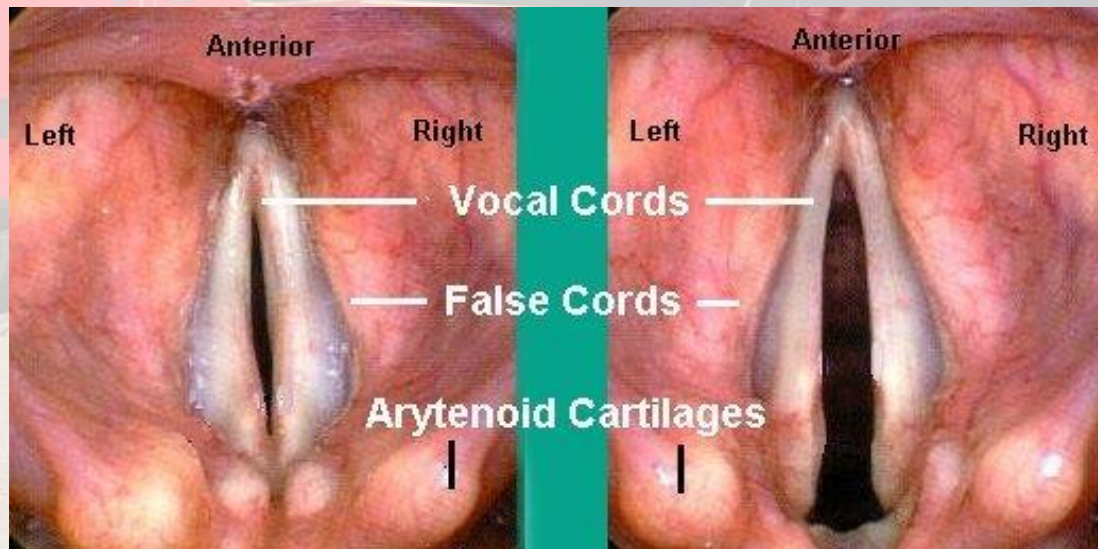
Lower Airways

- The lower airway begins at the trachea as it exits the neck and enters the chest. It consists of c-shaped cartilage rings held together by elastic-muscle tissue posteriorly, divides into the right and left mainstem bronchi and continues to the lung tissue.



Laryngoscopic View

- View during laryngoscopy is variable. Under ideal circumstances the epiglottis, arytenoid cartilages and nearly the entire vocal cords will be visible.



INDICATIONS



- ❑ One of the basic functions of a provider is to ensure a patent airway. A provider must be able to rapidly identify patients at risk and determine the most appropriate method to manage the airway.
- ❑ Immediate severe airway compromise in the context of trauma, drug overdose, status epilepticus, etc., where respiratory arrest is imminent.
- ❑ In AR only children 8 years and older are eligible

WHEN 15-LPM OF OXYGEN



JUST ISN'T ENOUGH

INDICATIONS

- When determining the best method for maintaining an airway, consider the following:
 - Is the patient at risk for a positional obstruction or aspiration?
 - Is there inadequate oxygenation and/or ventilation?
 - Is the patient's condition expected to deteriorate?
 - Is the patient 8 years or older ? (in AR)

Protocol Indications requiring P.A.I.

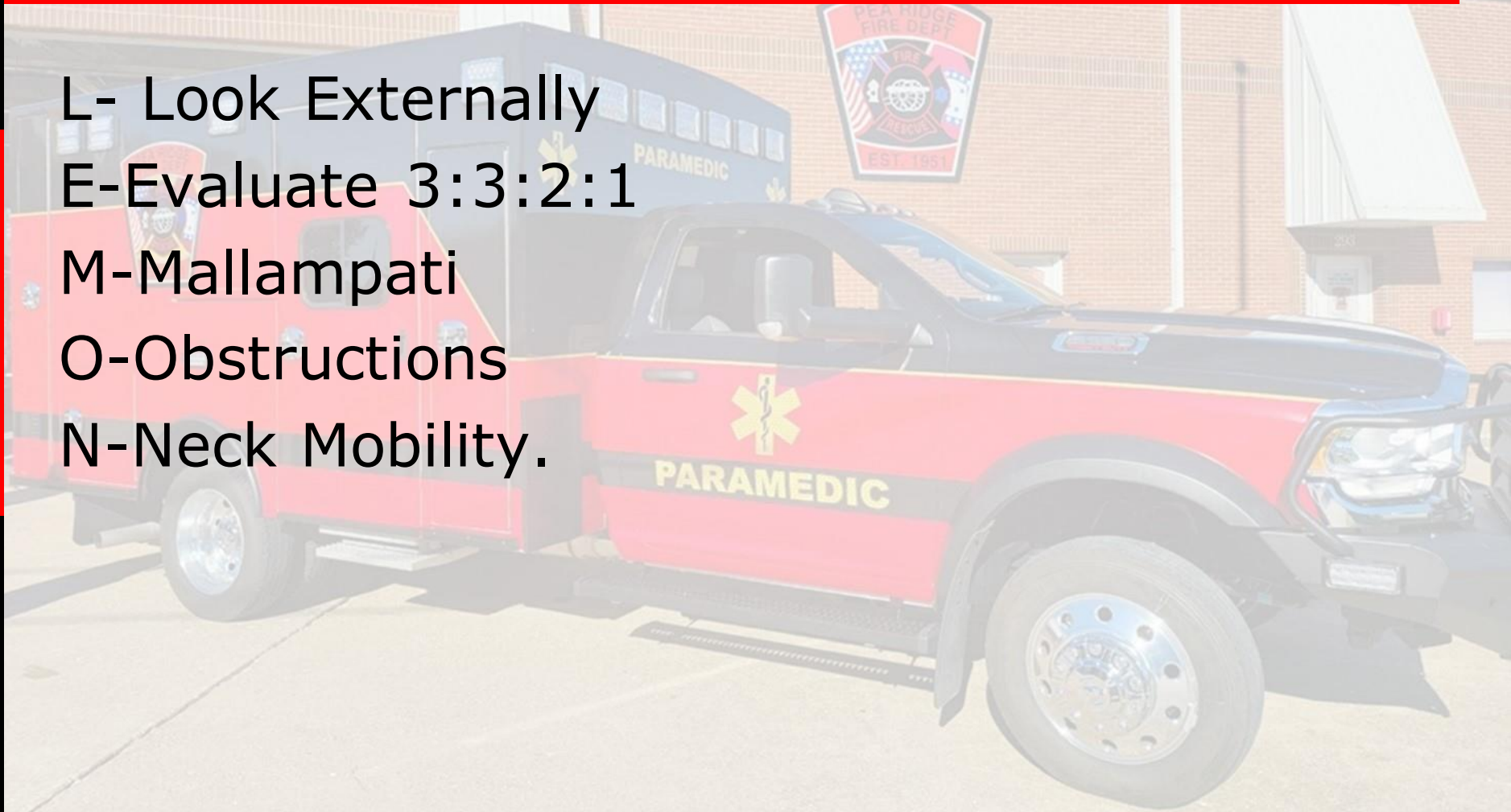
- **Conditions requiring oxygenation/ventilation control or positive pressure ventilation:**
 - A.L.O.C. where loss of airway is inevitable.
 - Airway compromise is a real possibility before or during transport.
 - Breathing is not adequate and likely to require intubation during transport.
 - Patients with trauma injuries not able to protect there airway.
 - Multi System trauma affecting adequacy of ventilations.
 - Inability to maintain O2 Sat greater than 90% with B.V.M. and N.P.A./O.P.A.

Prior to P.A.I

- ❑ Pre-oxygenation phase 100% O₂. 3-5 minutes prior.
- ❑ Capnography monitored.
- ❑ Apneic Oxygenation, Nasal cannula.
- ❑ I.V./I.O. access, remember 2 is better.
- ❑ Back up airways.
- ❑ Suction ready.
- ❑ Draw and label medications.
- ❑ Second Paramedic if available.

Lemon

L- Look Externally
E-Evaluate 3:3:2:1
M-Mallampati
O-Obstructions
N-Neck Mobility.



Look Externally

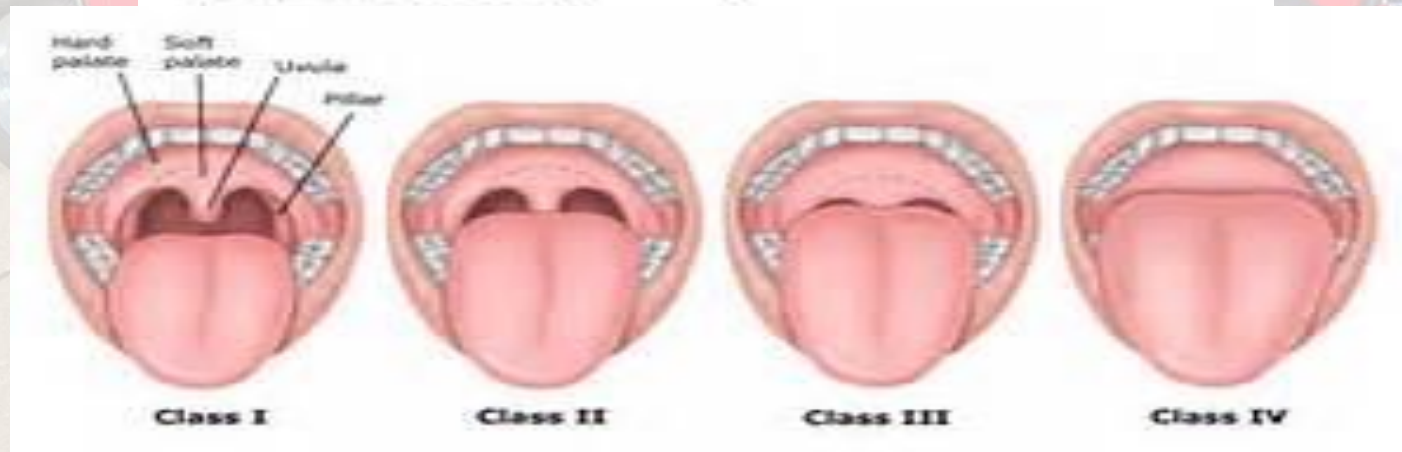


Look before you take the next step! Are there any deformities? Do you suspect a difficult intubation?

Evaluate 3:3:2



Mallampati score



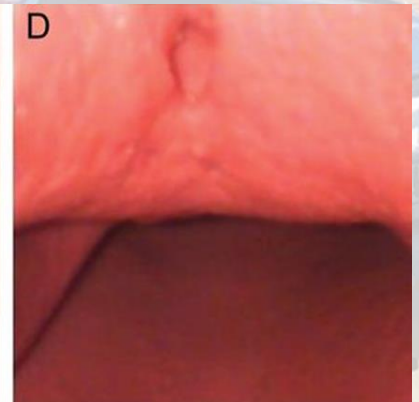
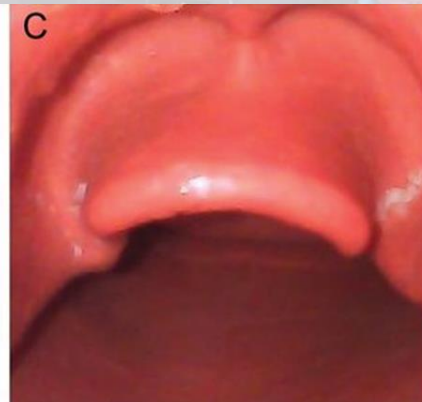
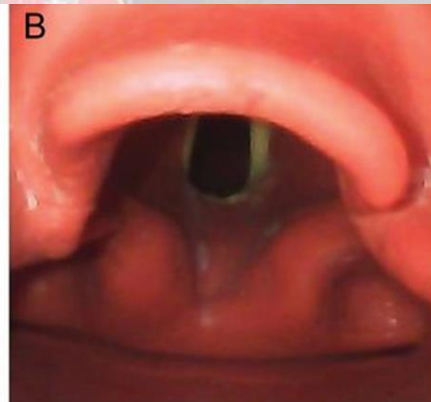
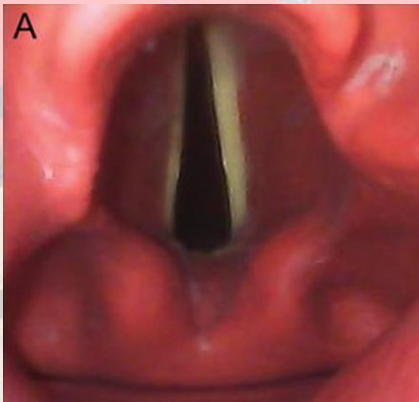
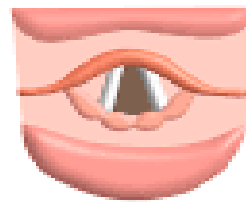
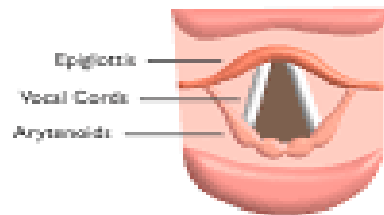
Cormack-Lehane

Cormack-Lehane
Grade I

Cormack-Lehane
Grade II

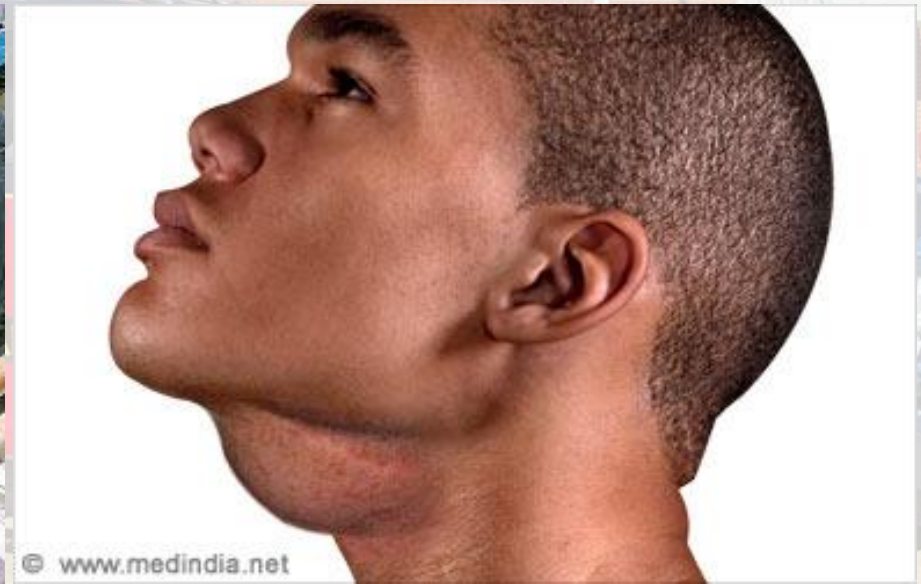
Cormack-Lehane
Grade III

Cormack-Lehane
Grade IV



Obstructions

Be aware of possible obstructions to the airway. These can be trauma related or medical.



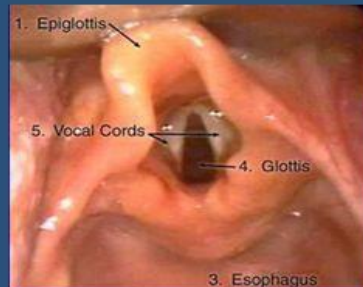
Obstructions

Upper Airway Obstruction



- Causes

- Laryngeal obstruction more commonly the result of:
 - Muscle spasm (laryngospasm)
 - Edema
 - Croup
 - Epiglottitis
 - Foreign material
 - Aspirate
 - Vomitus
 - Blood
 - Space-occupying lesions, e.g., tumors



Neck Mobility



Ask for a history! Patients with previous spinal surgeries or congenital defects will have a decreased mobility in the neck.



Pregnancy

- ❑ The medications are “Pregnancy Risk Category – C”
- ❑ No human studies and animal studies show adverse effect
- ❑ Transmission to breast milk uncertain – likely – but not a significant concern in an PAI situation
- ❑ “Because of the higher incidence of difficult intubation in pregnancy (due to increases in size and weight during pregnancy), optimal positioning of the patient becomes more important.”

Pregnancy

- ❑ Failure to manage the airway appropriately in a gravid patient potentially threatens not one life, but two, as maternal complications are the leading cause of fetal insult and death.¹ Understanding anatomic and physiologic changes in pregnancy paired with adequate preparation for airway management minimizes this risk.
- ❑ Although limited data exist concerning drugs for rapid sequence intubation in this population, etomidate and succinylcholine are considered acceptable in the gravid patient. Succinylcholine does not cross the placental barrier, although induction agents do. Etomidate does cross the placental barrier, but has been shown to cause less respiratory depression in the newborn than thiopental.¹⁰ (acep.org 7/2007)

What is my role as an E.M.T.?

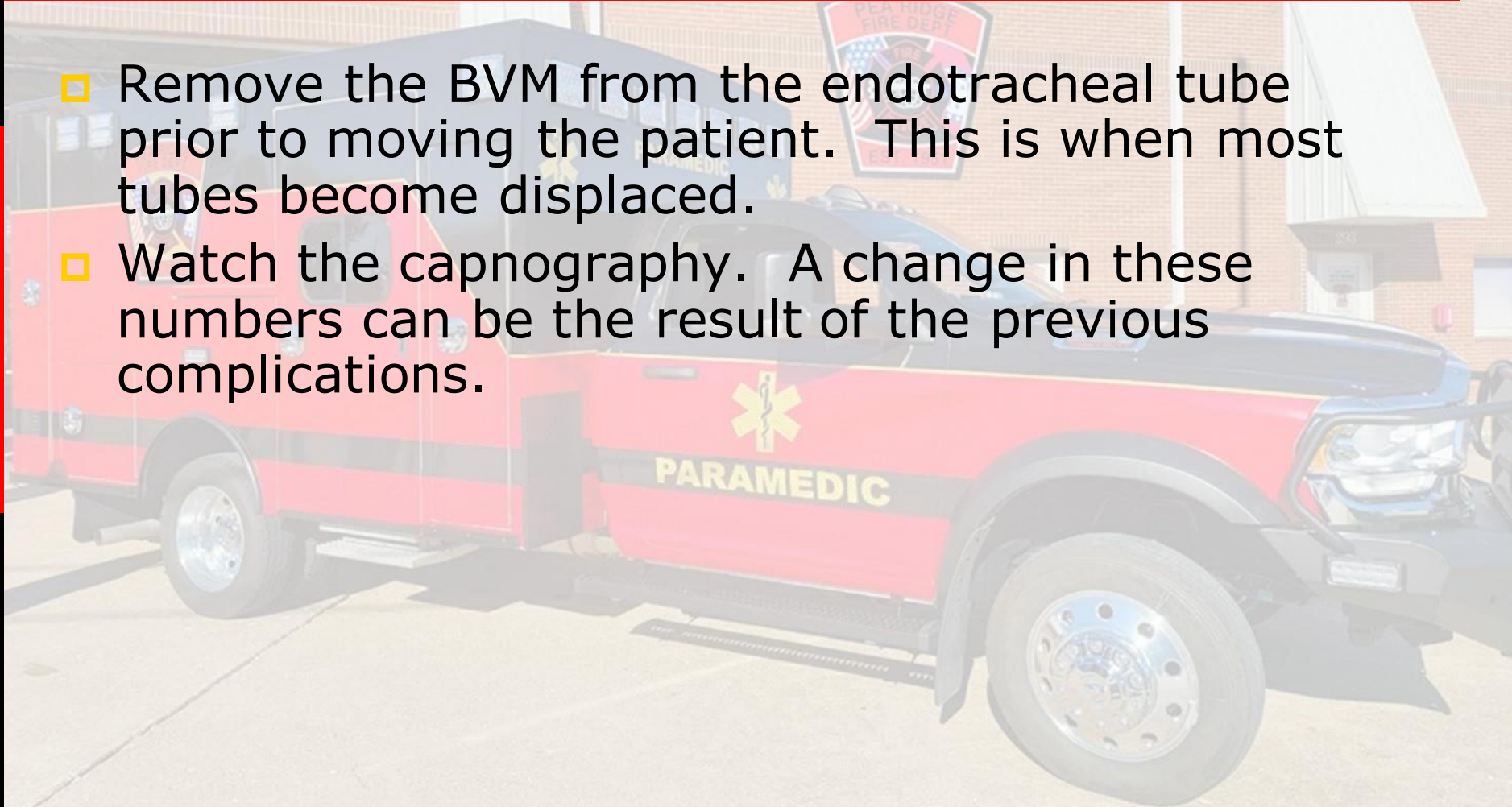
- Basic airway maintenance while the Paramedic prepares their equipment
- Positioning, suctioning, oral and nasal airways
- Pre-oxygenate with 100% O₂ via non-rebreather mask for at least 3-5 minutes
 - Replaces the patient's functional residual capacity (FRC) of the lung with oxygen
"Nitrogen Washout"

What is my Role? Cont.

- Ventilate the patient via the endotracheal tube. Do not push or pull on the tube. Place one hand on the patient's jaw and hold the tube tightly at the teeth as the Paramedic secures the tube. It is safest to continue to hold onto the tube even with a tube holder in place. This gives you better special orientation relative to the BVM and movement of the tube. Pay attention to the ease of ventilation and immediately tell the Paramedic if this changes at all. A change in ventilatory effort can mean: pneumothorax, displaced tube, equipment failure, and need for more sedation to name but a few.

What is my Role? Cont.

- ❑ Remove the BVM from the endotracheal tube prior to moving the patient. This is when most tubes become displaced.
- ❑ Watch the capnography. A change in these numbers can be the result of the previous complications.



Pharmacological Assisted Intubation (PAI)

<u>History</u>	<u>Signs and Symptoms</u>	<u>Differential</u>
<ul style="list-style-type: none"> ● Trauma ● Head Injury ● CVA ● Asthma ● COPD ● Known difficult airway ● Facial fractures ● Pulmonary edema ● Respiratory Distress 	<ul style="list-style-type: none"> ● Hoarseness ● Limited neck movement ● Limited mouth opening ● Short thyromental distance ● Short heavy neck ● Receding mandible/overbite ● Large swollen tongue ● Obesity ● Long incisors 	<ul style="list-style-type: none"> ● LOC ● Airway injury ● Airway swelling ● Burns ● Foreign body ● Epiglottitis

<u>Indication</u>	<u>Contra-Indications</u>
<ul style="list-style-type: none"> ● Altered mental status where the loss of airway is inevitable ● Airway compromise is a real possibility before or during transport ● Breathing is not adequate and likely require intubation during transport ● Patients with trauma injuries not able to protect their airway ● Multi System trauma affecting adequacy of ventilations ● Inability to maintain O2 Sat. of >90% with BVM and NPA/OPA ● Anticipated clinical course 	<ul style="list-style-type: none"> ● (PAI) is not approved in patients < 8 YO in Arkansas ● Do NOT attempt (PAI) if Cricothyrotomy would NOT be possible in the case of a failed (PAI) Attempt ● Do not attempt (PAI) if ventilations and intubation would be difficult or impossible such as Epiglottitis or partial airway obstruction

Universal Patient Care Protocol

<u>Pre-Oxygenation</u>
<ul style="list-style-type: none"> ● Capnography monitored throughout event/procedure ● Pre-Oxygenation Phase (100% Oxygen) 3-5 minutes prior to Laryngoscopy ● Prepare and apply Apneic Oxygenation

<u>Induction</u>
<ul style="list-style-type: none"> ● Administer Sedative / Anesthetic Agent

Protocols read top to bottom, left to right. Black font identifies BLS skills/treatments or considerations, while Blue font identifies an ALS skill/treatment or consideration.

Pharmacological Assisted Intubation (PAI)

<u>Crash Airway</u> (When appropriate)
Indications
<ul style="list-style-type: none"> ● Unconscious / Unresponsive need for paralytic administration to perform intubation
<ul style="list-style-type: none"> ● Administer Paralytic ● Increase apneic oxygenation to 10-15 lpm until confirmed intubation
<u>Laryngoscopy</u>
<ul style="list-style-type: none"> ● Perform intubation as necessary
<u>Post Intubation Management</u>
<ul style="list-style-type: none"> ● Continued sedation with post-intubation sedative ● Monitor, anticipate and treat pain for management/discomfort of intubation <ul style="list-style-type: none"> ○ Monitor for / anticipate hypotension ● Consider long-acting paralytic only if sedation methods are not effective in keeping the patient sedated

<u>Notes</u>	<u>Associated Protocols/Resources</u>
<ul style="list-style-type: none"> ● Document ET or Supraglottic Tube Placement at the transfer of the patient. ● Keep it simple – Use progressively invasive maneuvers only when necessary. ● Clinical End Tidal CO2 monitoring should be used with all advanced airways. ● Pulse Oximetry is used for all airway/ventilation problems...when circulation allows and maintained above 90% at all times. ● Maintain spinal precautions and neutral alignment when trauma is suspected. ● In an attempt to define intubation in the emergent setting and to collect/record accurate data, this group shall define an intubation attempt as “the introduction of the laryngoscope with the intent of passing a ET tube through the cords.” It is strongly recommended that providers, prior to intubation, attempt to obtain a view of the oropharynx to identify concerns prior to an intubation attempt. If landmarks are identified and intubation can be accomplished, it should be done with a first pass success recorded. <ul style="list-style-type: none"> ○ After making adjustments following a single view, if the tube is placed with the second introduction of the laryngoscope, it should be recorded as a first pass success. All 	

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Pharmacological Assisted Intubation (PAI)

<p>additional attempts shall be recorded in successive order.</p> <ul style="list-style-type: none">• Once ET or Supraglottic tube is placed and confirmed, apply a cervical collar and maintain C spine immobilization to prevent displacement of the tube• Unsuccessful intubation attempts<ul style="list-style-type: none">○ Use a secondary device ASAP○ Ventilation performed with BVM and adjunct placed/used as needed○ In the event a patient cannot be ventilated by any other means perform a surgical airway as a means of last resort.	
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Protocols read top to bottom, left to right. Black font identifies BLS skills/treatments or considerations, while Blue font identifies an ALS skill/treatment or consideration.

What are the medications and what will I see?

□ Etomidate:

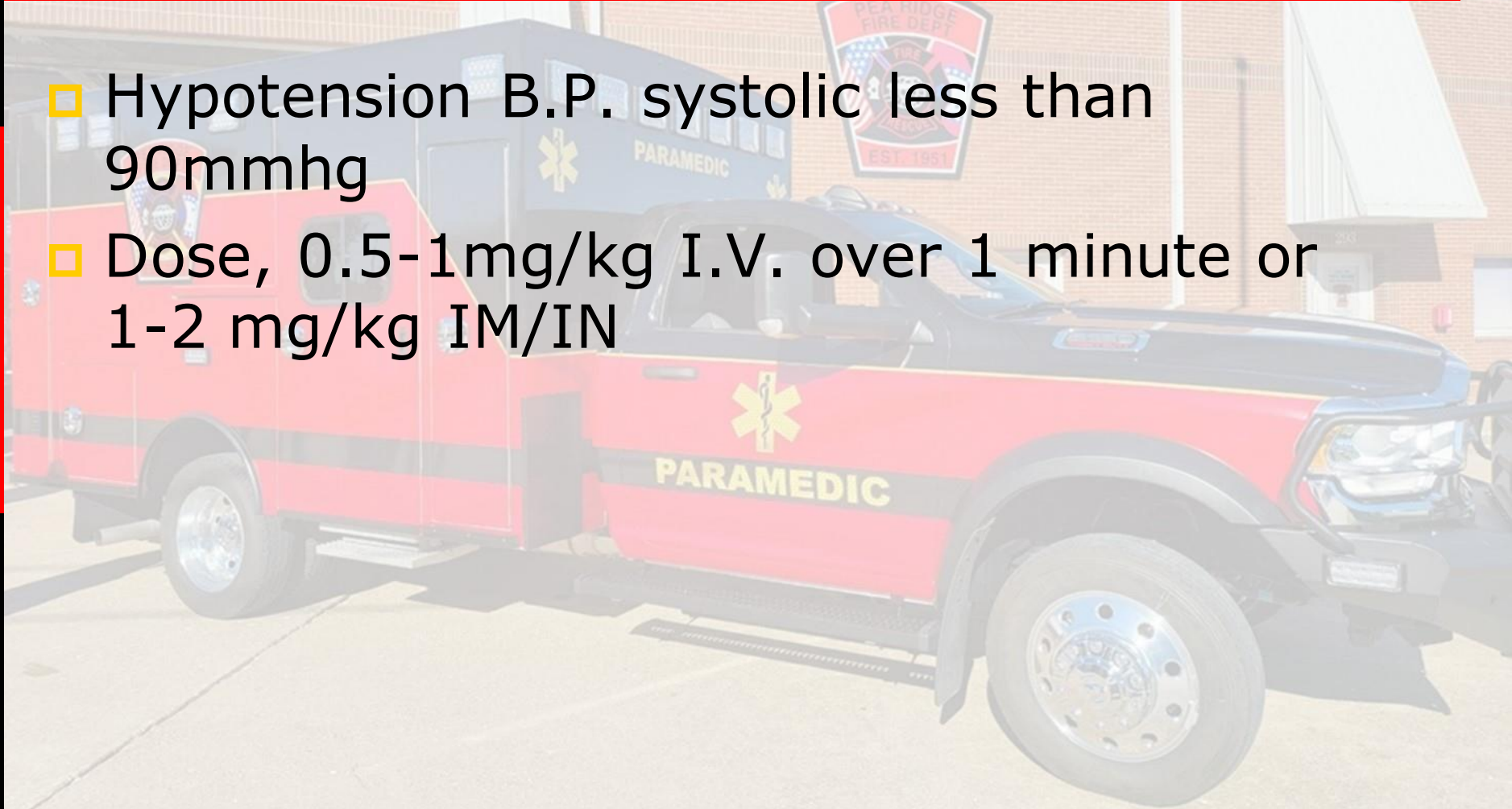
- Sedative that is given prior to paralyzing the patient.
- Paralyzation has no affect on sensation or mentation.
- There are few things crueller than paralyzing a conscious patient.
- This is a quick acting drug (one arm-brain cycle) and has a short half life.

Etomidate

- Etomidate can burn at the IV sight and up the extremity so warn the patient.
- Many are asleep though before they complain of it burning.
- The dose is 0.3mg/kg IVP; typically 20, 30, or 40mg and lasts 5-6 minutes.
- Etomidate is one of the safest PAI drugs there is and has no known direct hemodynamic effect on the patient

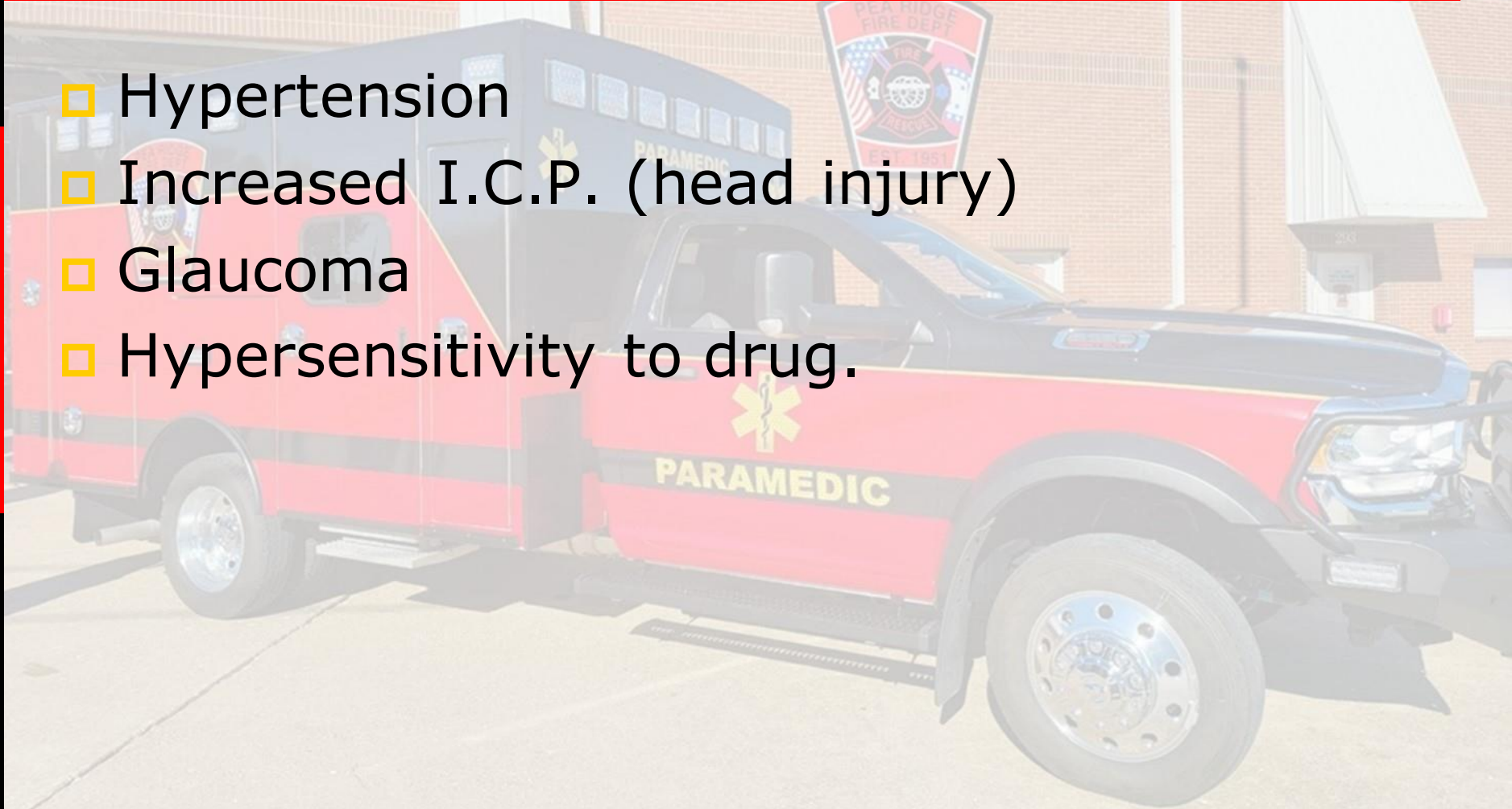
Ketamine can be used as an induction medication

- Hypotension B.P. systolic less than 90mmhg
- Dose, 0.5-1mg/kg I.V. over 1 minute or 1-2 mg/kg IM/IN



Ketamine contra-indication

- ❑ Hypertension
- ❑ Increased I.C.P. (head injury)
- ❑ Glaucoma
- ❑ Hypersensitivity to drug.



What are the medications and what will I see?

□ **Succinylcholine:**

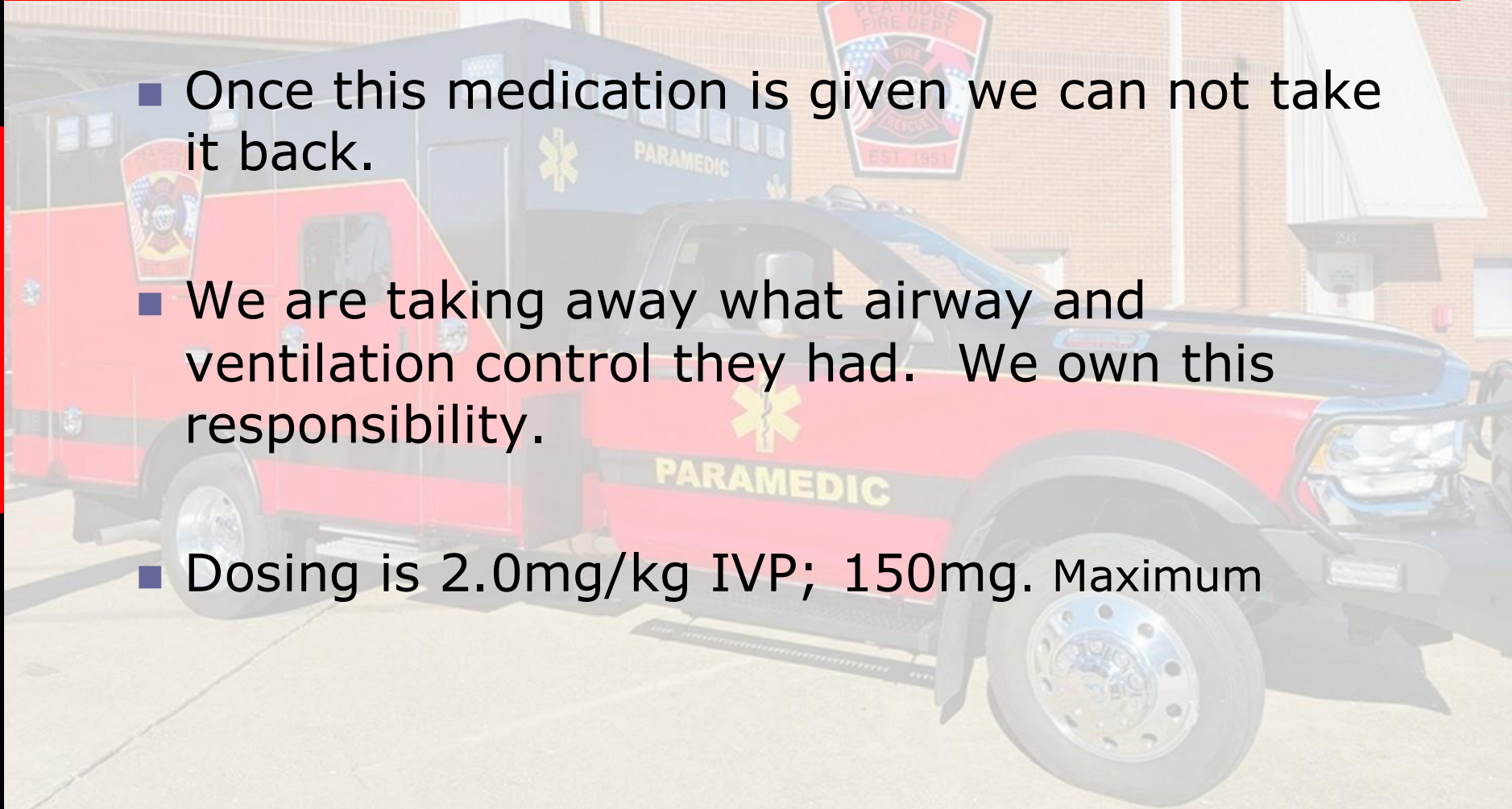
- Short acting paralytic known as a “Depolarizing Agent”.
- This means that all of the body’s cells will fire prior to relaxing and the patient will “Fasciculate”.
- This presents as overall twitching.

Succinylcholine

- The patient will then stop breathing.
- Remember that this medication does nothing to sensation and mentation. Hearing, sight, etc, are intact dependent upon sedation.
- Succinylcholine has a duration of 5-10 minutes also which is why it is the preferred P.A.I. paralytic.

Succinylcholine

- Once this medication is given we can not take it back.
- We are taking away what airway and ventilation control they had. We own this responsibility.
- Dosing is 2.0mg/kg IVP; 150mg. Maximum



Contraindications

Succinylcholine

- Rhabdomyolysis: rapid breakdown of skeletal muscle due to injury to muscle tissue. May be caused by physical (e.g., crush injury), chemical, or biological factors.
- Known/suspected hx of hyperkalemia. Administration of Succs, causes a “Potassium dump” and doing so in these patients may result in acute cardiac arrhythmia. Patients with Renal Failure would be a good example of a patient with suspected hyperkalemia.
- Major crush injury
- Spinal cord injury greater than 3 days old
 - ▣ Pseudocholinesterase deficiency
 - ▣ Neuromuscular disease
 - ▣ Malignant Hyperthermia (patient or family)

Contraindications

Succinylcholine

- ❑ Anticipating an airway that you can't manage
- ❑ HX or family history of malignant hyperthermia.
- ❑ Penetrating eye injuries
- ❑ Narrow angle glaucoma
- ❑ Children less than 8 years of age.
- ❑ Prolonged immobility

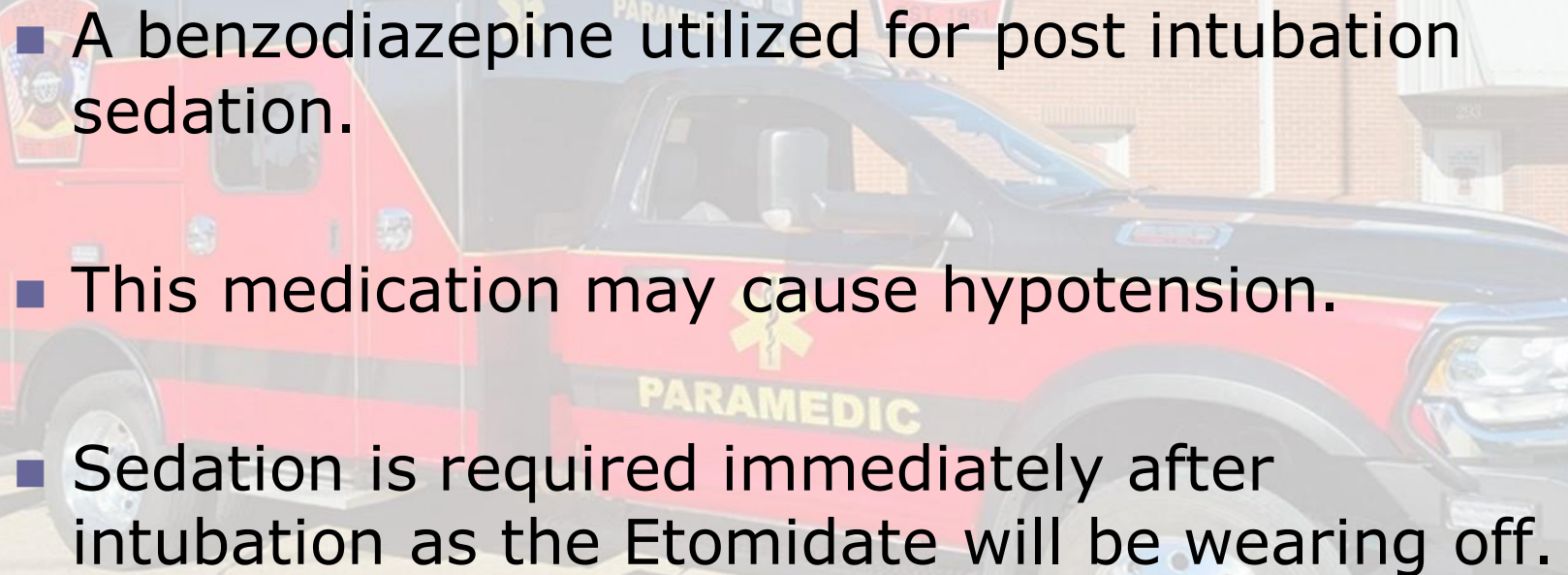
What are the medications and what will I see?

□ **Rocuronium:**

- is a “Non-depolarizing Agent” and does not cause fasciculation.
- It does however have a 20-40 minute half life.
- This medication is typically utilized after they have been intubated or in cases where Succinylcholine is contraindicated.
- Dosing is 1mg/kg IVP; typically 50, 100, or 150mg.

What are the medications and what will I see?

□ **Versed (midazolam):**

- A benzodiazepine utilized for post intubation sedation.
 - This medication may cause hypotension.
 - Sedation is required immediately after intubation as the Etomidate will be wearing off.
- 

Versed (midazolam):

- Indications for subsequent doses are; tearing, coughing against the tube, rises in heart rate and the capnography numeric.
- Increases in movement are late signs.
- Dosing 2.5mg every 2 minutes to effect or systolic of 90.
- Max dose of 20mg

What are the medications and what will I see?

□ Fentanyl:

- Man made narcotic similar to Morphine
- Fentanyl has less risk of hypotension and allergic reactions than does morphine.
- Sedation and paralyzation have no affect on pain sensors so Fentanyl is important in patients with a pain component such as trauma or head bleeds.

Fentanyl

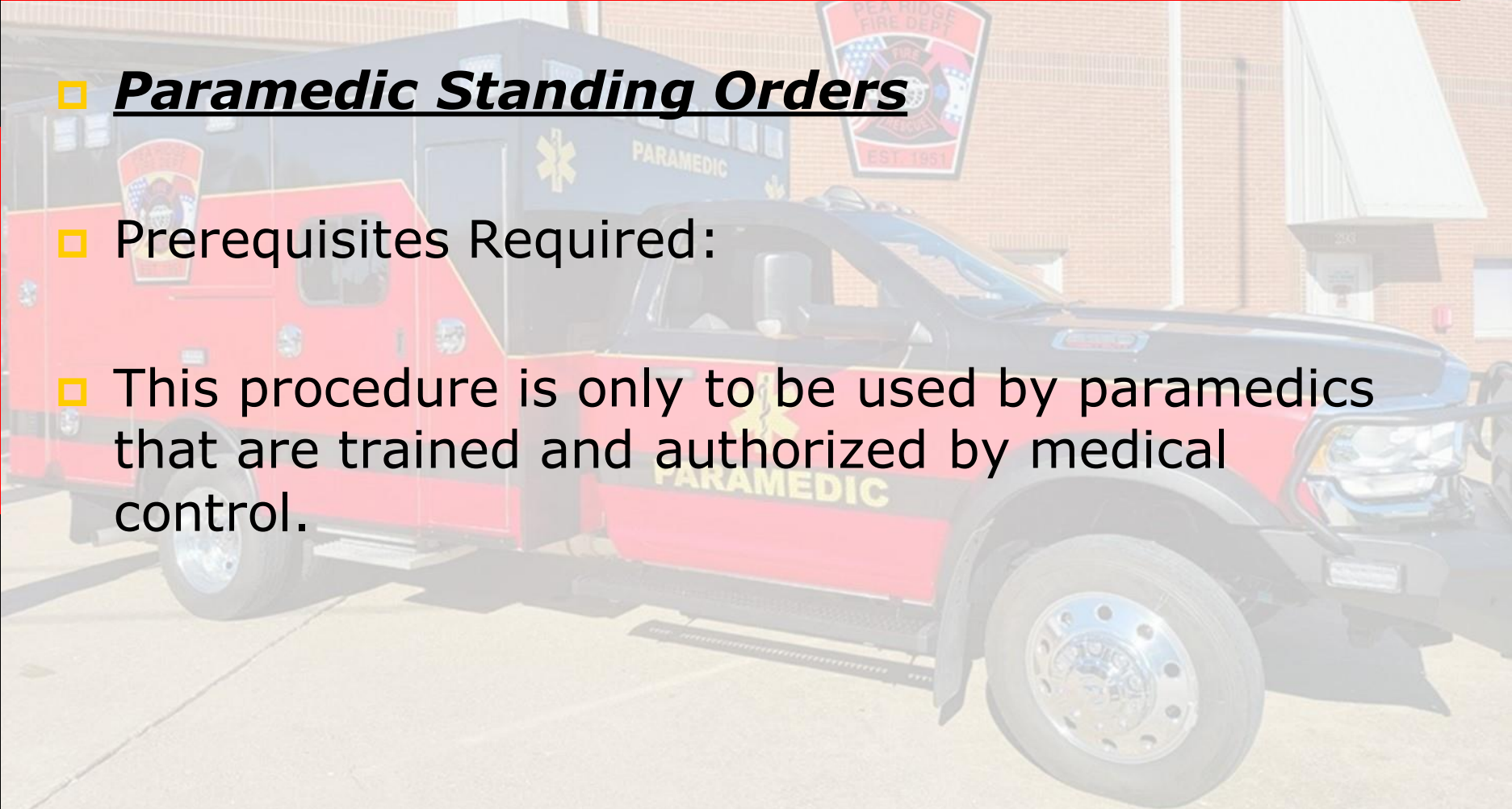
- Fentanyl also works synergistically with versed to assist in sedation.
- Dosing is 0.5-1 mcg/kg for analgesia. Onset is immediate.
- May repeat at 2-3 min to a max of 2mcg/kg
- Peak Effects 3-5 minutes IV
- Duration 15-30 minutes with half life 6-8 hours



PAI medications are authorized for PAI Paramedics only!

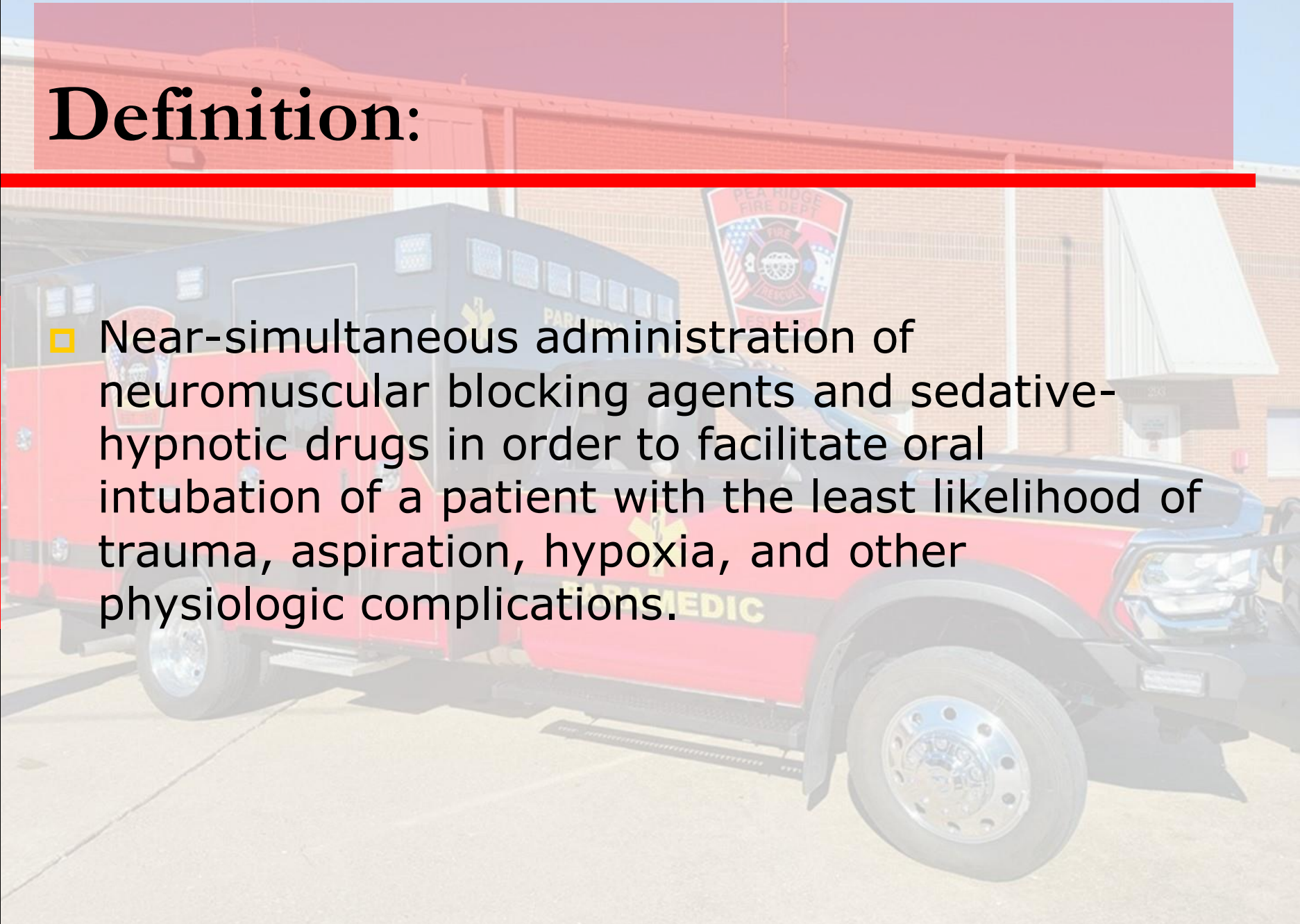
RAPID SEQUENCE INTUBATION (PAI) 5.4

- **Paramedic Standing Orders**
- Prerequisites Required:
 - This procedure is only to be used by paramedics that are trained and authorized by medical control.



Definition:

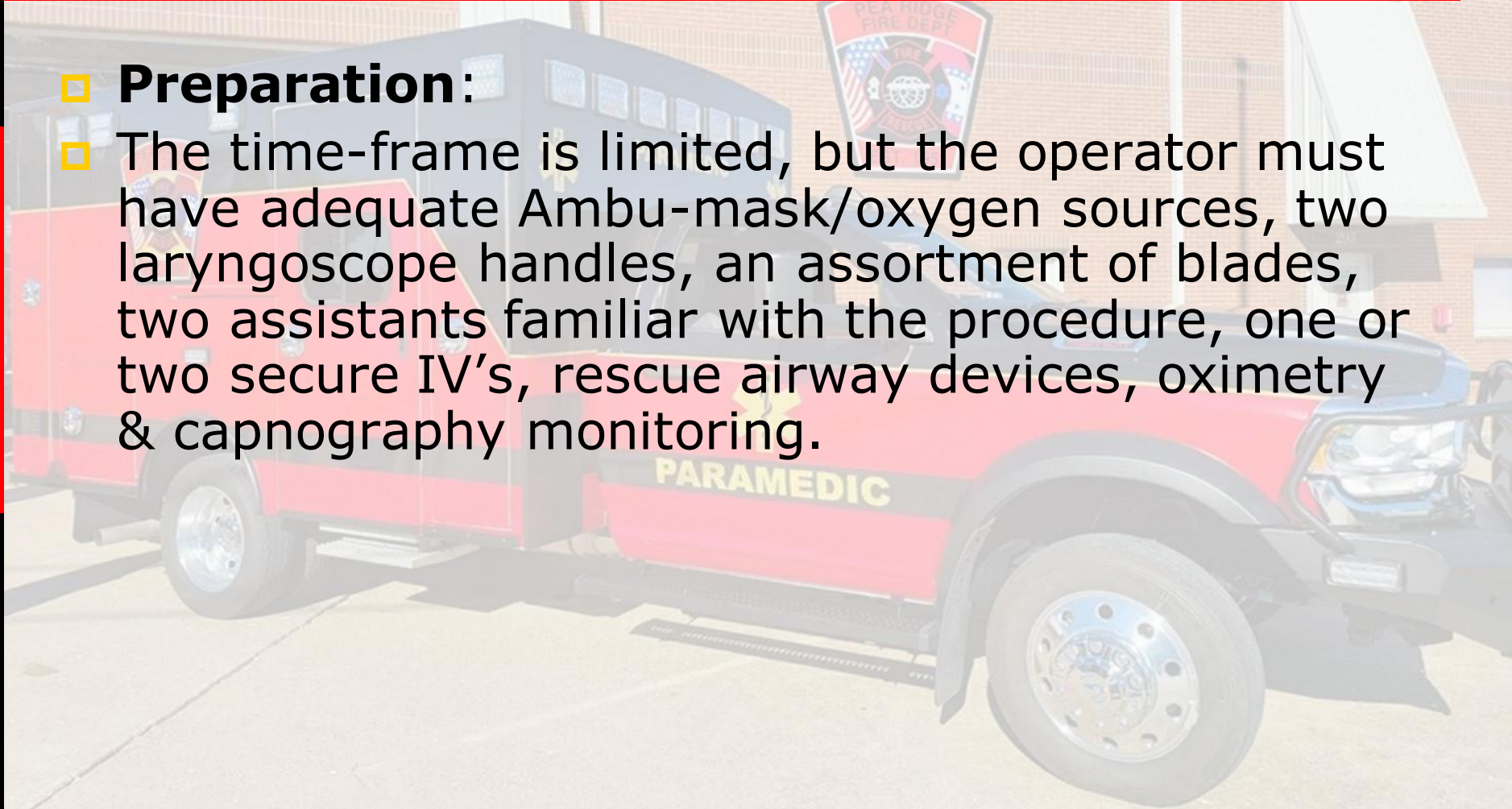
- Near-simultaneous administration of neuromuscular blocking agents and sedative-hypnotic drugs in order to facilitate oral intubation of a patient with the least likelihood of trauma, aspiration, hypoxia, and other physiologic complications.



Procedure: The six “Ps”

□ Preparation:

- The time-frame is limited, but the operator must have adequate Ambu-mask/oxygen sources, two laryngoscope handles, an assortment of blades, two assistants familiar with the procedure, one or two secure IV's, rescue airway devices, oximetry & capnography monitoring.



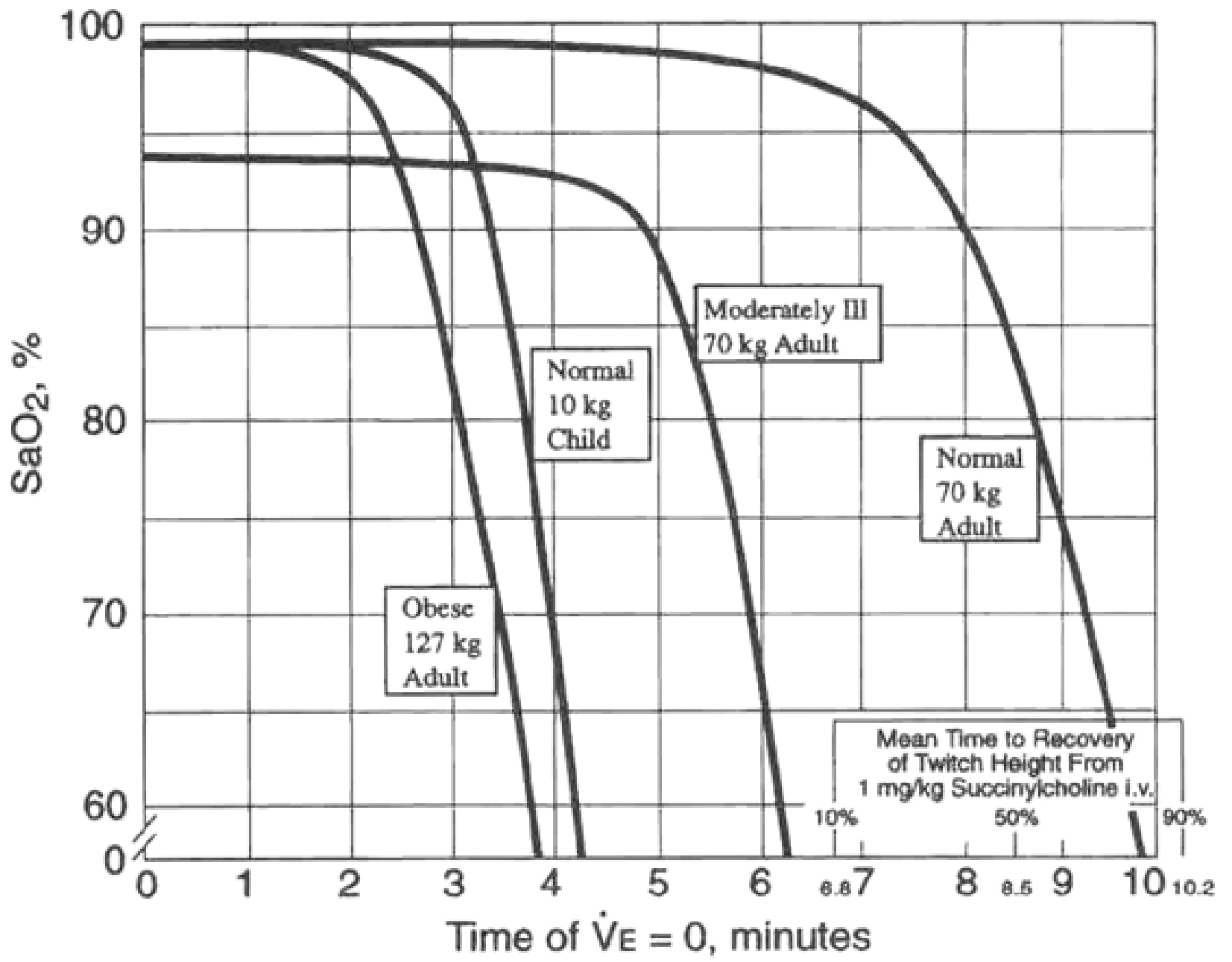
Procedure: The six “Ps”

□ **Preoxygenation:**

- When possible a nonrebreather mask for several minutes is more effective in performing nitrogen washout and establishing an adequate oxygen reserve during the procedure. In emergent cases, three mask breaths with 100% oxygen may suffice, remember apneic oxygenation I.E. nasal cannula at 15 L.P.M.. Prior to intubation.

Pre oxygenation continued

- If done properly, this will permit as much as 3-4 minutes of apnea before hypoxia develops (but don't test that theory!)
- In emergent cases, three mask breaths with 100% oxygen may have to suffice.
- Resist the use of positive pressure ventilation (PPV). Use only if the patient is not ventilating adequately.
- PPV leads to gastric distention → regurgitation → aspiration

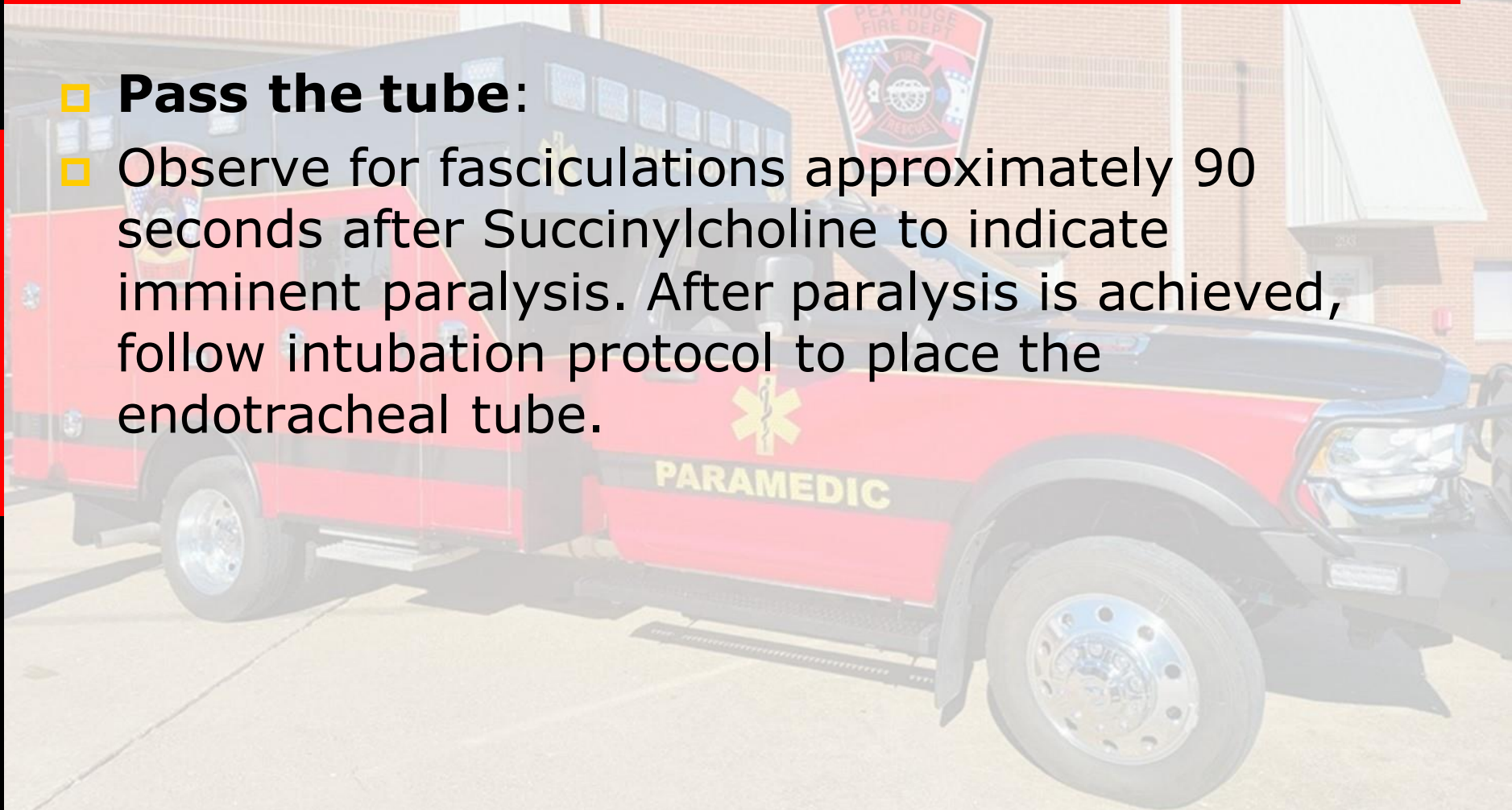


Procedure: The six “Ps”

- **Paralyze:**
- Etomidate (0.3mg/kg IV)..
- Succinylcholine (2.0mg/kg IVP maximum 150mg) immediately after Etomidate
- **Rocuronium**, if succinylcholine is contra indicated. (1mg/kg IVP)

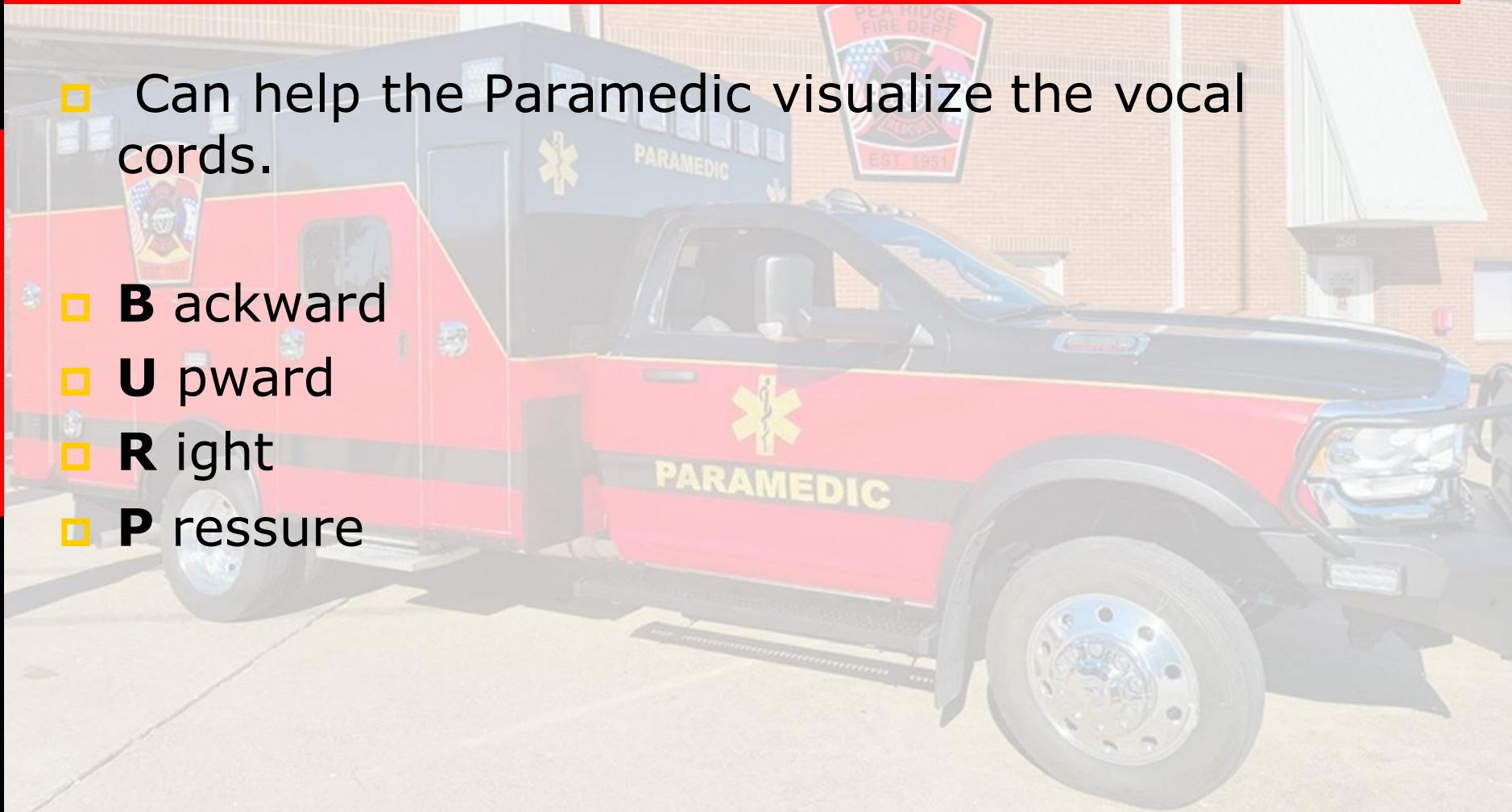
Procedure: The six “Ps”

- **Pass the tube:**
- Observe for fasciculations approximately 90 seconds after Succinylcholine to indicate imminent paralysis. After paralysis is achieved, follow intubation protocol to place the endotracheal tube.



BURP

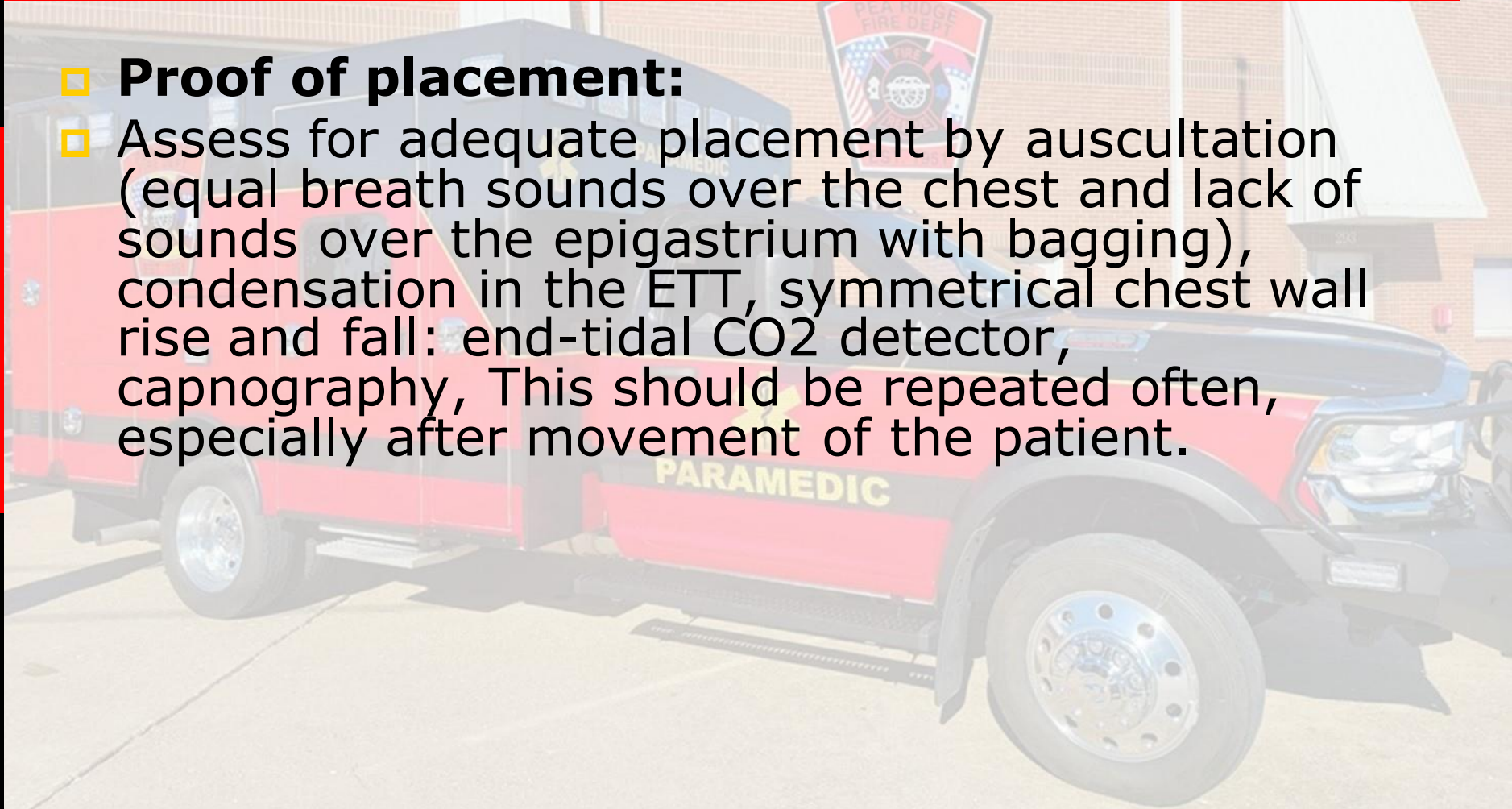
- Can help the Paramedic visualize the vocal cords.
- **B** ackward
- **U** pward
- **R** ight
- **P** ressure



Procedure: The six “Ps”

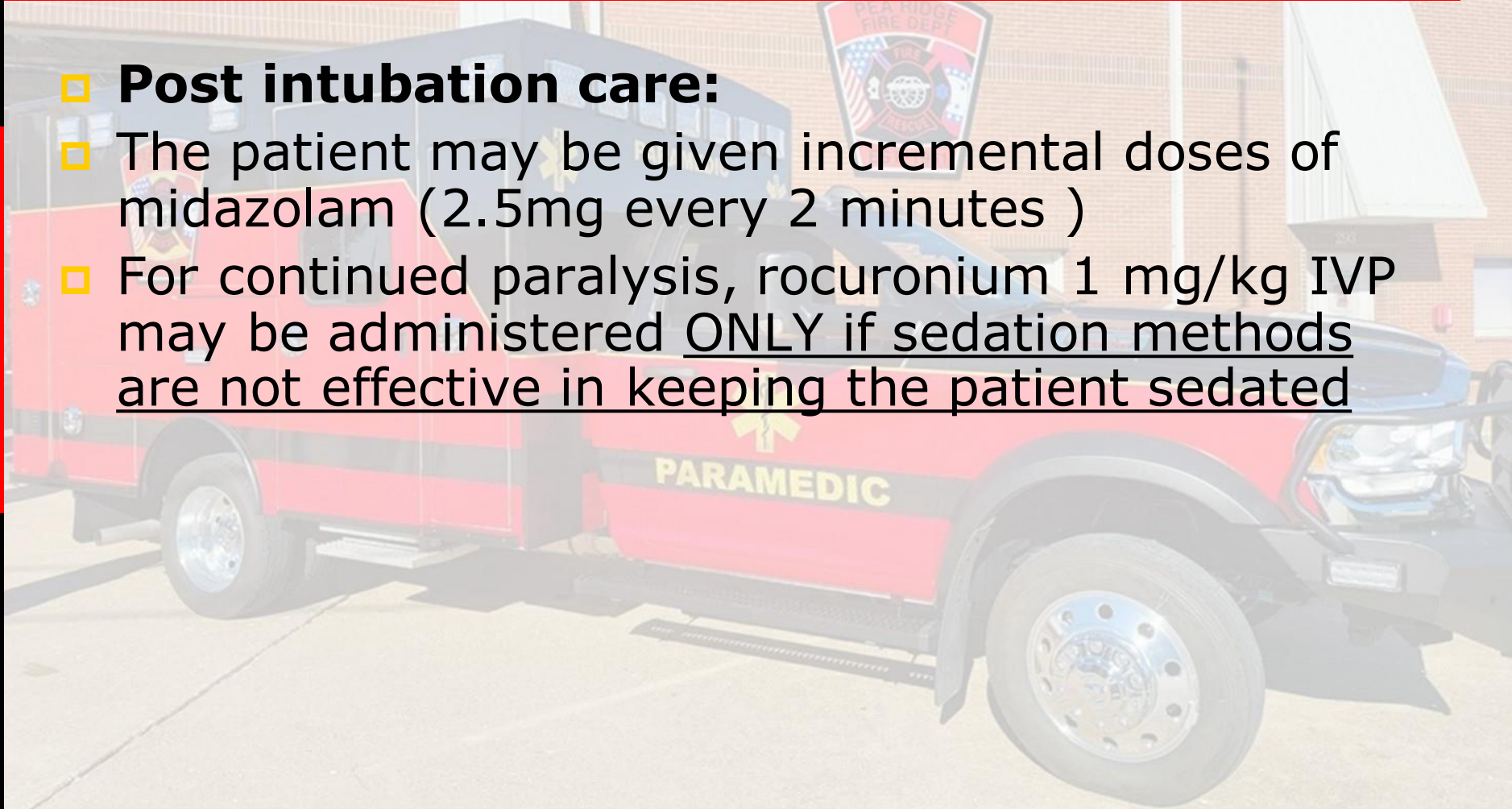
□ **Proof of placement:**

- Assess for adequate placement by auscultation (equal breath sounds over the chest and lack of sounds over the epigastrium with bagging), condensation in the ETT, symmetrical chest wall rise and fall: end-tidal CO₂ detector, capnography, This should be repeated often, especially after movement of the patient.



Procedure: The six “Ps”

- ❑ **Post intubation care:**
- ❑ The patient may be given incremental doses of midazolam (2.5mg every 2 minutes)
- ❑ For continued paralysis, rocuronium 1 mg/kg IVP may be administered ONLY if sedation methods are not effective in keeping the patient sedated



I-gel Supraglottic Airway

Indications:

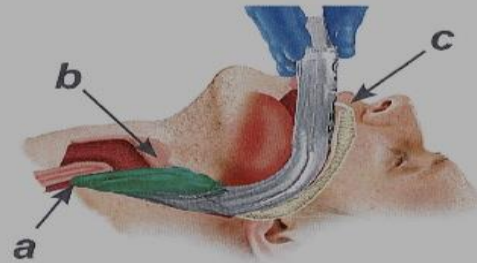
An alternative to endotracheal intubation for airway management

Contraindications:

- Responsive patients with an intact gag reflex.
- Any patients that have ingested caustic substances

Procedure:

1. Choose the appropriate sized i-gel based on the patients weight.
2. Remove the i-gel from the protective cradle.
3. Grasp the i-gel along the integral bite block and lubricate the back, sides and front of the cuff with a thin layer of water soluble lubricant.
4. Grasp the lubricated i-gel firmly along the integral bite block. Position the device so that the i-gel cuff outlet is facing towards the chin of the patient. The patient should be in the 'sniffing the morning air' position with head extended and neck flexed. The chin should be gently pressed down before proceeding.
5. Glide the device downwards and backwards along the hard palate with a continuous but gentle push until a definitive resistance is felt .
6. The tip of the airway should be located into the upper esophageal opening (a) and the cuff should be located against the laryngeal framework (b). The incisors should be resting on the integral bite-block (c).



7. Secure the i-gel with either a commercial device or tape the i-gel down from 'maxilla to maxilla'.

Notes:

- If there is early resistance during insertion a 'jaw thrust' or 'Insertion with Deep Rotation' is recommended.
- Sometimes a feel of 'give-way' is felt before the end point resistance is met. This is due to the passage of the bowl of the i-gel through the faucial pillars. It is important to continue to insert the device until a definitive resistance is felt.
- Once definitive resistance is met and the teeth are located on the integral bite block, do not repeatedly push i-gel down or apply excessive force during insertion.
- It is not necessary to insert fingers or thumbs into the patient's mouth during the process of inserting the device.

i-gel

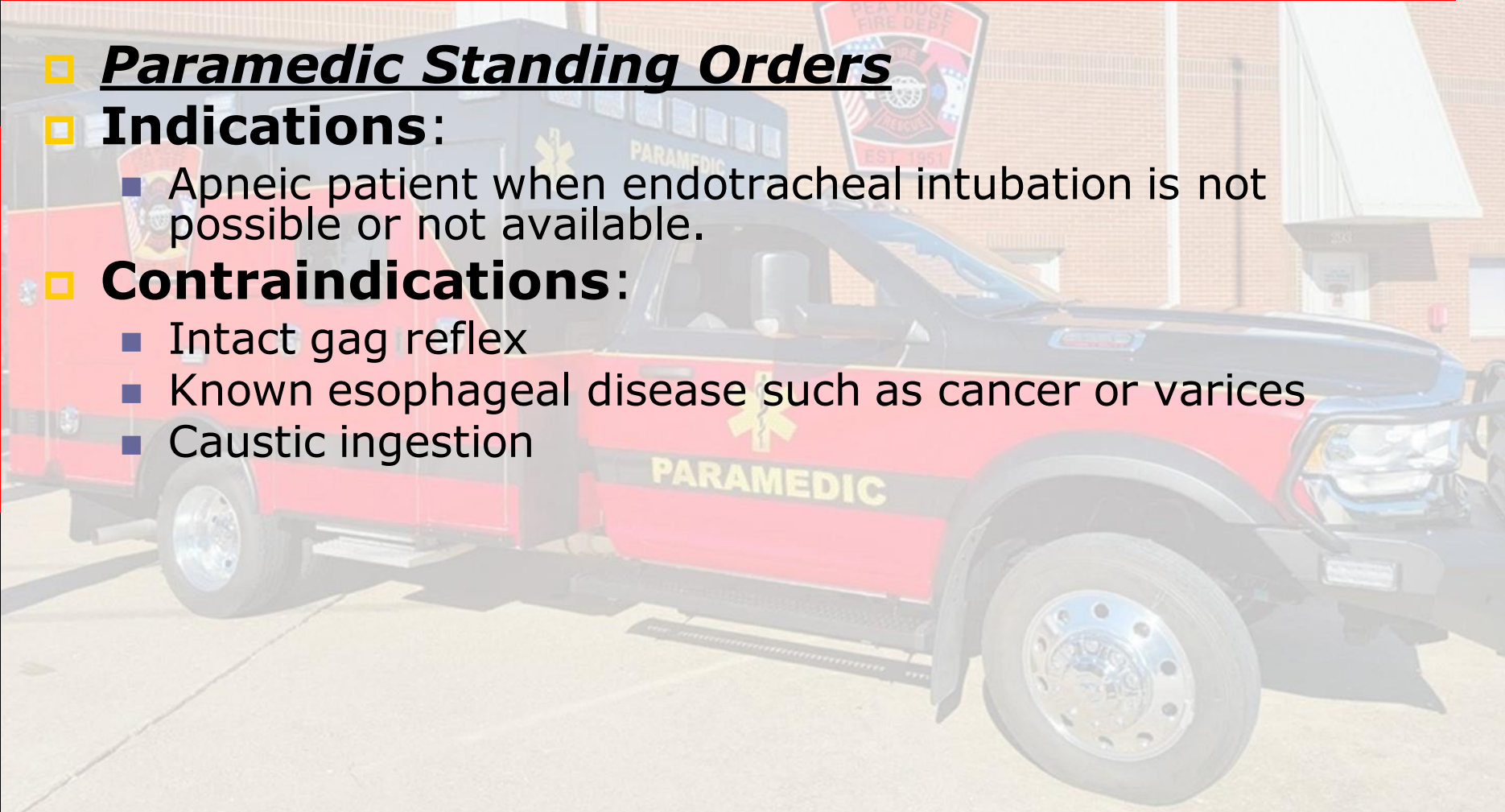
□ **Paramedic Standing Orders**

□ **Indications:**

- Apneic patient when endotracheal intubation is not possible or not available.

□ **Contraindications:**

- Intact gag reflex
- Known esophageal disease such as cancer or varices
- Caustic ingestion



i-gel



i-gel

□ Procedure:

□ Choose correct size:

□ Size	Weight (kg)	Patient Size
□ 3	30-60	Small adult
□ 4	50-90	Medium adult
□ 5	90+kg	Large adult



i-gel

- ❑ **Prepare i-gel**
- ❑ Inspect for damage
- ❑ Lubricate device with water soluble lubricant
- ❑ Preoxygenate the patient, if time permits.
- ❑ Remove dentures or plates from mouth
- ❑ Press down chin and jaw with your gloved hand and open downward.
- ❑ Introduce soft tip into mouth and advance behind base of tongue with a gentle push until resistance is felt.
- ❑ It is not necessary to insert fingers in the patients mouth.

i-gel

- Connect Etco2 detector to the device
- Connect the King i-gel to a bag-valve device and ventilate the patient
- RECORD Etco2 waveform !!!



i-gel

- Assess for adequate placement by auscultation (equal breath sounds over the chest and lack of sounds over the epigastrium with bagging), condensation in the ETT, symmetrical chest wall rise and at least one additional method: colorimetric end-tidal CO₂ detector, capnography, or esophageal tube detector (note: this device should be used prior to ventilation to be accurate).

i-gel

- This should be repeated often, especially after movement of the patient.
- Secure the device.



ADVANCED SUCTIONING

□ Basic & Intermediate & Paramedic Standing Orders

□ **Indication**

- Obstruction of the airway (secondary to secretions, blood, and/or any other substance) in a patient currently being assisted by an airway adjunct such as an endotracheal tube, Combitube, tracheostomy tube, or a cricothyrotomy tube

ADVANCED SUCTIONING

□ Procedure

- Ensure the suction device is operable
- Pre-oxygenate the patient
- While maintaining aseptic technique, attach the suction catheter to the suction unit.
- If applicable, remove ventilation devices from the airway.
- Insert the sterile end of the suction catheter into the tube without suction.
- Insert until resistance is met, pull back approximately 1-2 cm.

Caution... never PAI a patient that
you can not Cricothyrotomy

□ Never take away something you cant give back

□ Any Questons??

