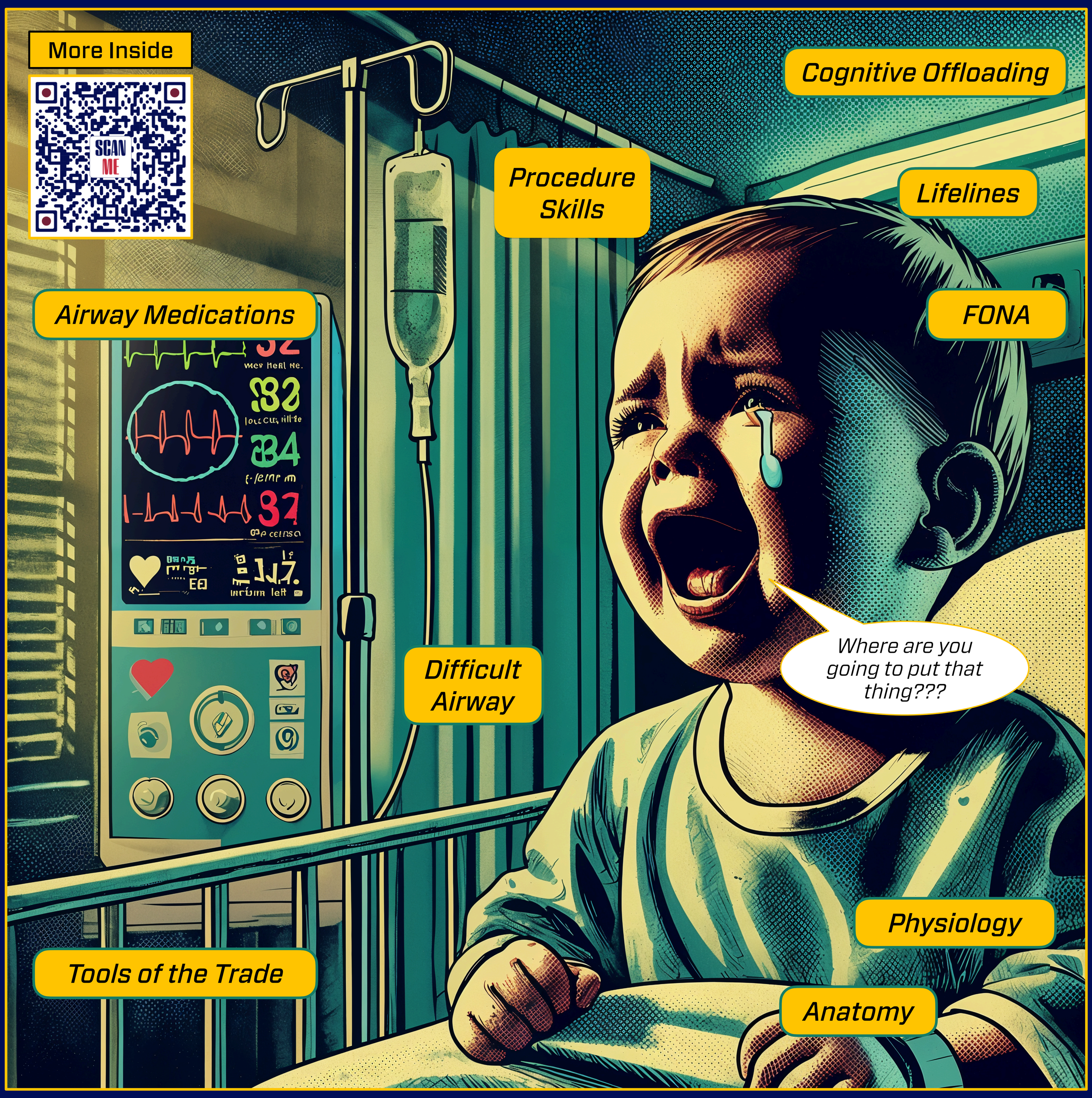
THE PEDIATRIC AIRWAY

THEY'RE NOT JUST LITTLE ADULTS, GOT IT?

Children aren't just small adults—their unique anatomy and physiology, along with pediatric-specific causes of respiratory compromise, demand a different approach to airway management. Understanding these differences is key to executing a safe, effective strategy when every second counts. In this space, we'll break down the essential concepts, tools, and skills you need to confidently handle any pediatric airway emergency. Let's dive in and get you prepared!



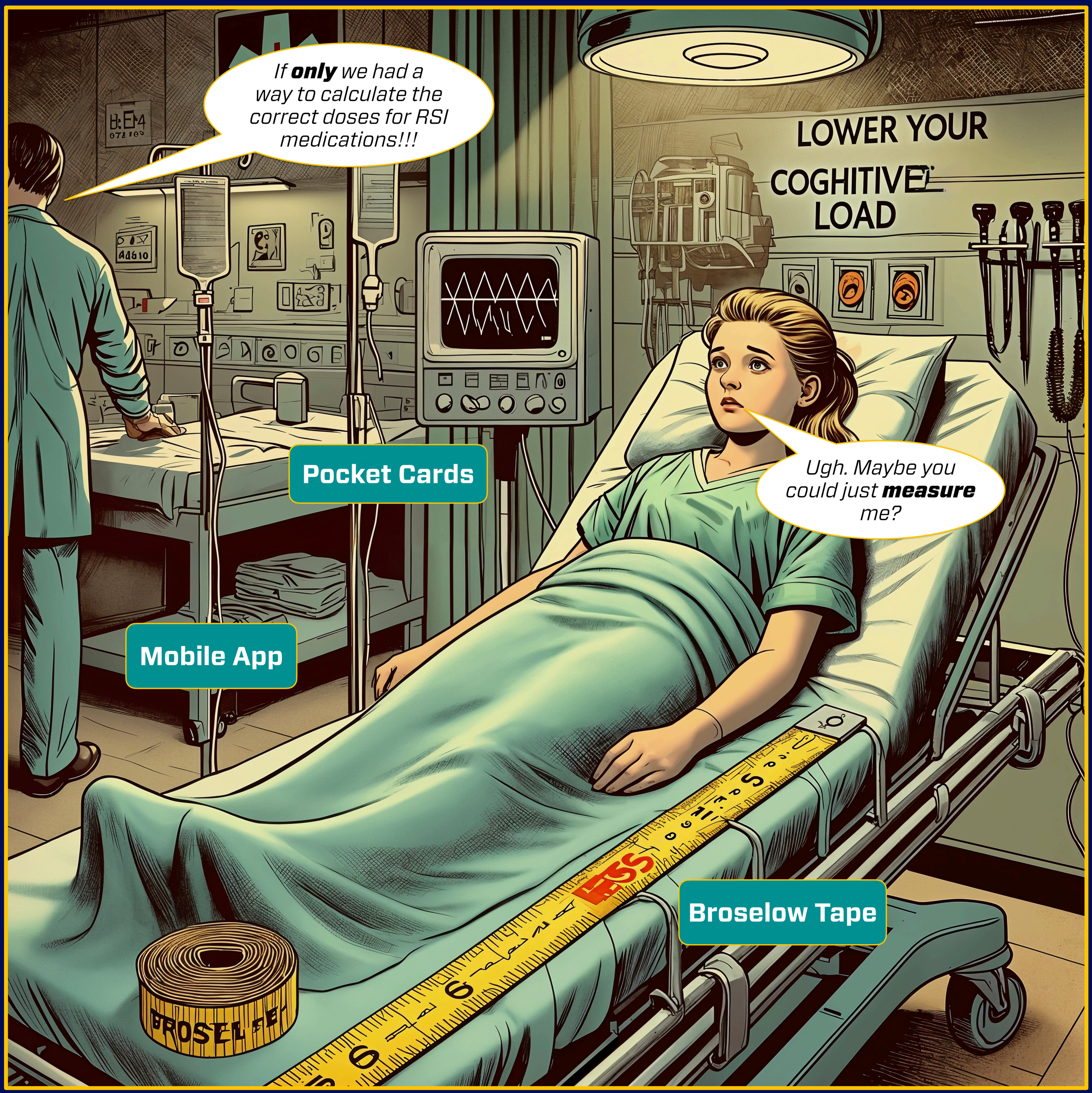
301 PED

COGNITIVE TOOLS

REMEMBER TO STOP, DROP, ROLL
& LOWER YOUR COGNITIVE LOAD!

SCAN ME

In the chaos and stress of a pediatric airway emergency, calculating doses and sizing equipment create an increased cognitive burden during resuscitation. We suggest you stop, take a breath, and then reach for the tools that will make this process automatic and decrease your cognitive load when dealing with a critically ill child. Length-based resuscitation tape like the Broselow still work!

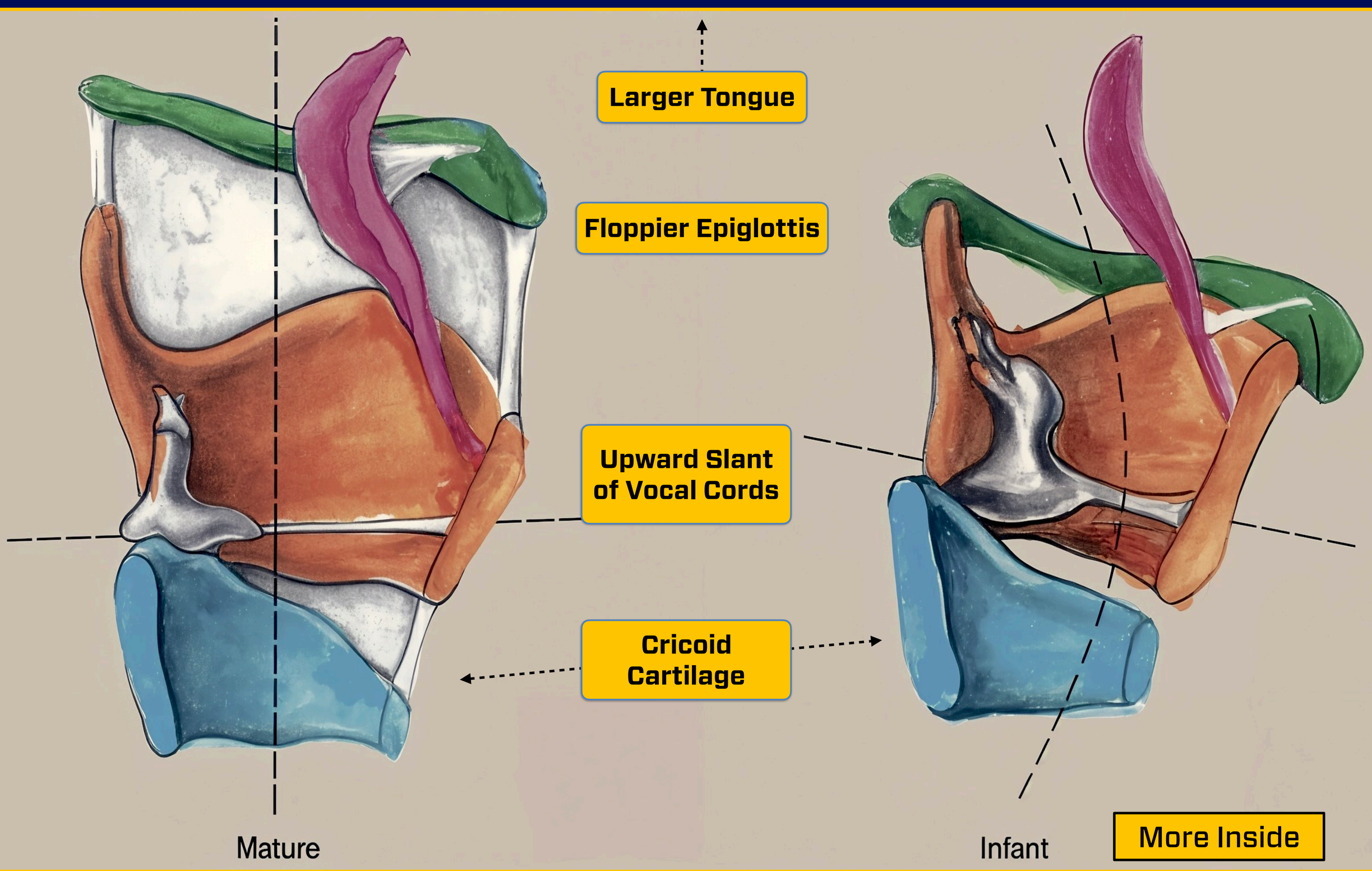


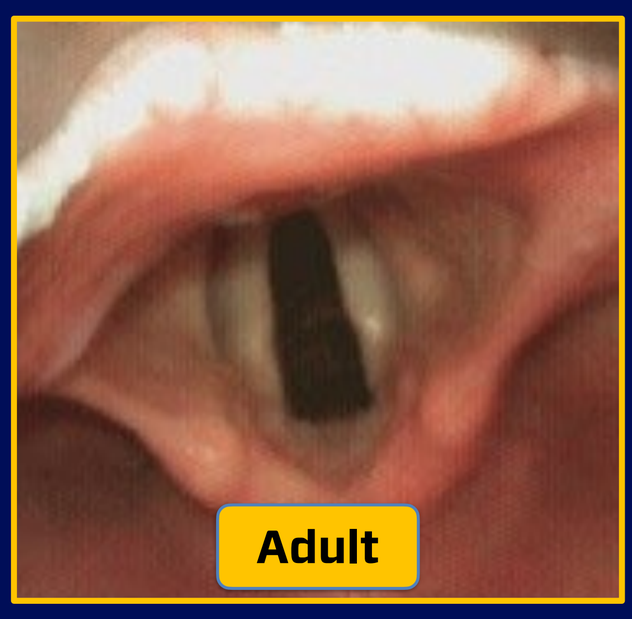
302 PED CORE KNOWLEDGE

ANATOMY OF THE PEDIATRIC AIRWAY

SMALL DIFFERENCES CAN HAVE LARGE EFFECTS

As the pediatric airway develops from neonate to infant, subtle anatomical changes significantly impact intubation techniques. In neonates, the airway is relatively smaller and positioned more anteriorly, featuring a high-riding, omega-shaped epiglottis. These characteristics make direct laryngoscopy more challenging and often require a straight blade and optimal head positioning, such as using a shoulder roll, to align the airway axes. As the infant grows, the larynx descends, the epiglottis becomes less prominent, and the airway gradually resembles a more adult-like configuration, making intubation progressively easier. These developmental changes influence blade choice, positioning strategies, and overall airway management, underscoring the importance of age-specific considerations in pediatric intubation. We discuss them here.





SCAN ME

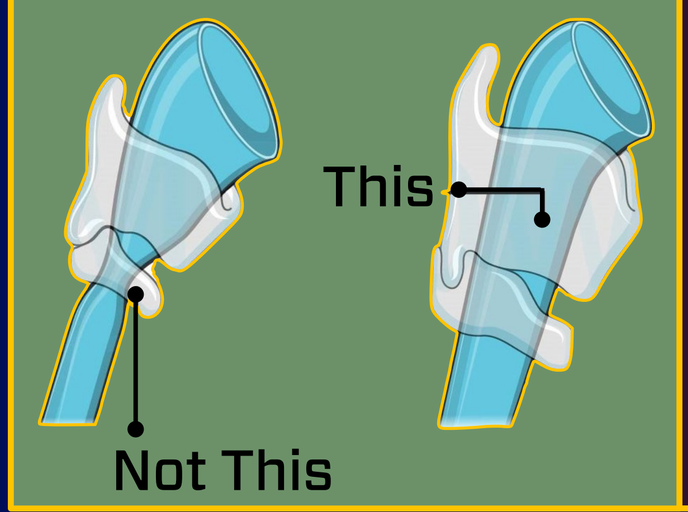
Children face a higher risk of respiratory arrest due to limited respiratory compensation. Mouth breathing is complex and often inefficient; infants naturally breathe through their noses, and young children have smaller airways, where minor changes can lead to significant physiological and anatomical issues. When was the last time you heard an adult with a barky cough?

303 PED

MYTH BUSTING

SAVE THAT CONE FOR ICE CREAM!

ANATOMICAL DIFFERENCES IN THE PEDIATRIC AIRWAY



It has been a commonly held belief that the pediatric airway is conical, with the narrowest part being at the level of the cricoid. This is in contrast to an adult airway that is cylindrical in shape with the glottis being the narrowest portion. However, recent studies using radiologic imaging techniques (magnetic resonance imaging and computed tomography) or direct bronchoscope observation have questioned this tenet. The pediatric larynx may be more cylindrical than funnel shaped after all. The debate remains. We discuss more pediatric airway anatomy realities and myths here.

Did you know that people once believed your airway was conical in shape like that ice cream cone?

That's so silly! My airway is a cylinder, just like my mom's!

Imaging studies and endoscopic observations indicate that the narrowest point of the pediatric airway is often at the glottis (vocal cords), not the cricoid cartilage.

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CRITICAL CONCEPT

SMALL ADULTS?

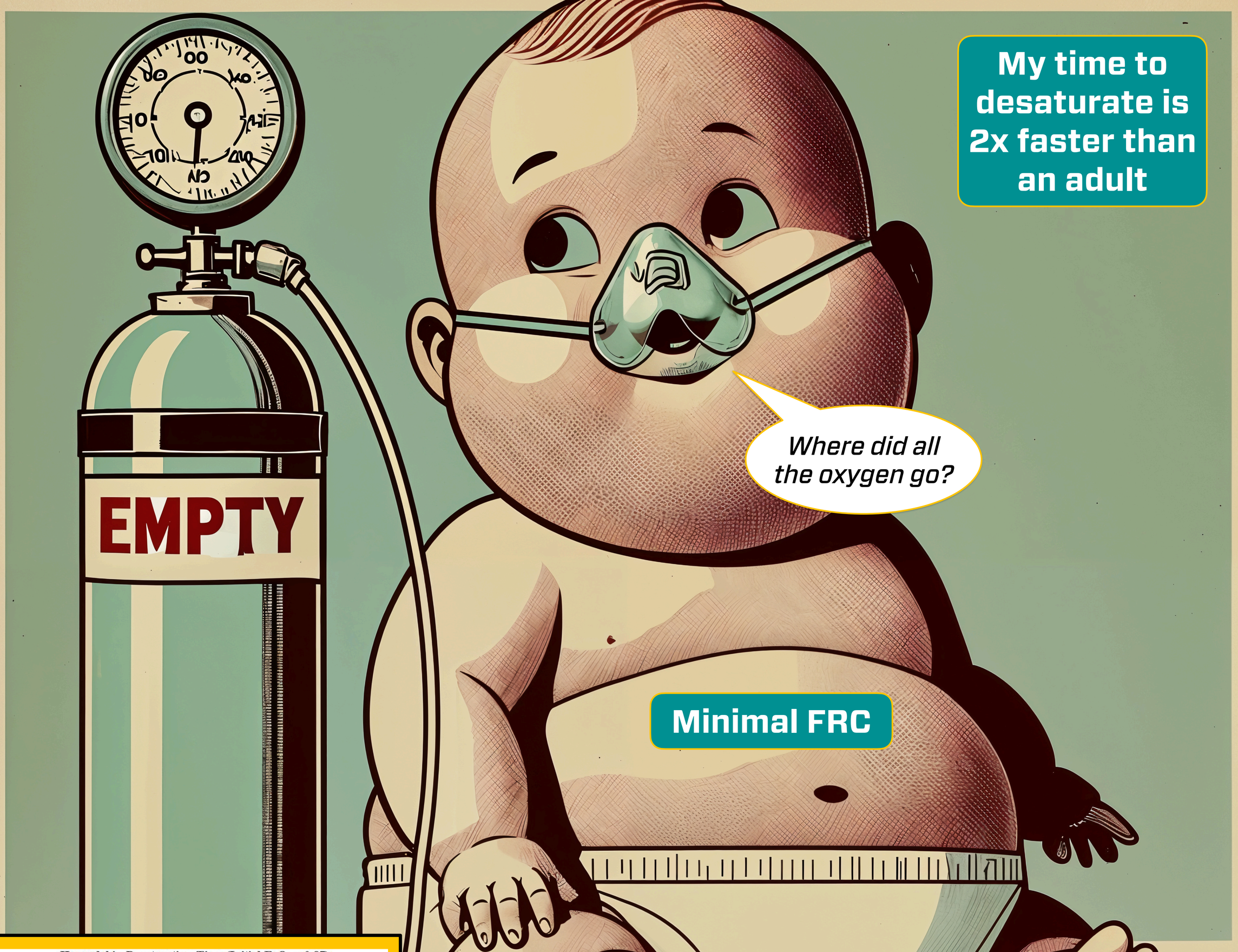
MORE LIKE OBESE ADULTS!

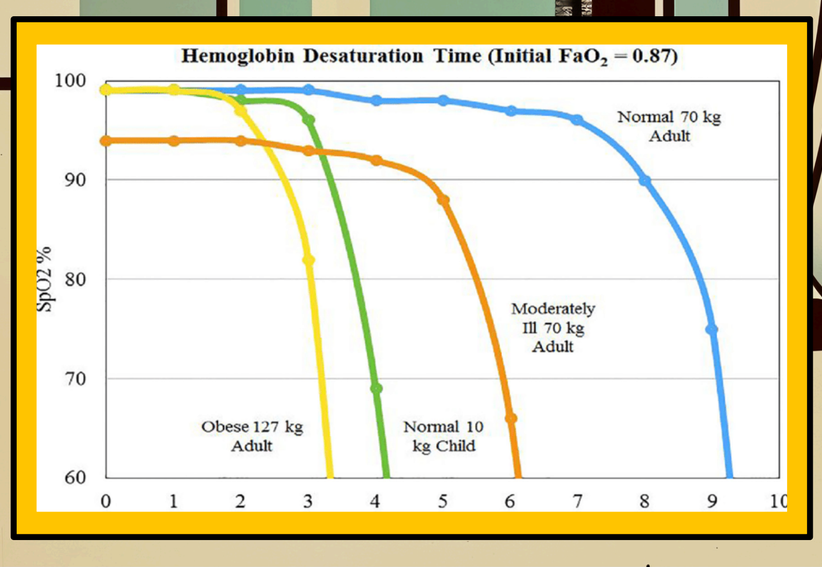
CHILDREN ARE AT HIGHER RISK FOR HYPOXEMIA

SCAN ME

Children have an inherently higher risk for hypoxemia despite optimal pre-oxygenation. They have a shorter desaturation time than adults and less functional residual capacity (FRC). Understanding these differences will help anticipate, recognize, and even prevent complications that may be encountered in managing the pediatric airway. Proper positioning of a pediatric patient is needed to set yourself up for success. Start with a neutral supine position, and aim to align the ear to the sternal notch. A jaw thrust or PEEP can also make a world of difference. Apenic oxygenation is also a valuable addition to any oxygenation strategy.

Positioning is key





305 NEO

IMPORTANT SKILL

FACE MASK VENTILATION

FOR THE PEDIATRIC AIRWAY

Bag-valve-mask (BVM) ventilation is a cornerstone skill in pediatric airway management. It is critical for providing oxygenation and ventilation in respiratory failure, cardiopulmonary arrest, or peri-intubation scenarios. Due to children's anatomical and physiological differences, effective face mask ventilation requires a precise technique, appropriate equipment selection, and an understanding of common pitfalls. This module focuses on optimizing BVM ventilation in pediatric patients through hands-on skills, troubleshooting strategies, and evidence-based best practices.

Two-person BVM technique offers significant advantages in pediatric resuscitation, including improved tidal volumes, better mask seal, and reduced provider fatigue

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PARADIGM SHIFT

CUFFED ONLY PLEASE

SHOULD WE DO AWAY WITH UNCUFFED TUBES?

It was once believed that uncuffed tubes were best for children under 8 years of age. It was thought that cuffs caused tracheal injury, that they impeded gas exchange due to the smaller tube diameters of cuffed tubes that could be placed, and that they were unnecessary due to the shape of the pediatric trachea. Well, throw that all out! There is now good evidence to show that cuff tubes have many advantages to uncuffed tubes and we go through the data with you here.

Advantages of Cuffed Tubes

- Lower Risk of Aspiration
- Better control of ventilator parameters (Efficient ventilation)
- Fewer tube exchanges (Increased security/ Decrease leaks)
- Lower gas flow

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308 PED

CORE KNOWLEDGE

CHOOSE YOUR BLADE!

CURVED OR STRAIGHT FOR THE PEDIATRIC AIRWAY

The provider’s preference and comfort should determine which blade is used. Classically, the straight blade has been preferred in young children, as the Miller blade is designed to lift the epiglottis directly. Studies have shown both blades to be comparable in success in pediatric intubation, obtaining a similar glottic view. Remember, because the uvula and epiglottis are in close proximity in children due to the high position of the larynx, slow advancement of the blade into the larynx is required to avoid overshooting the epiglottis. The larynx's higher location and anterior position create a more acute angle from the base of the tongue to the glottic aperture, posing a challenge in aligning the oral-pharyngeal-tracheal axis.

309 PED STANDARD OF PRACTICE

VIDEO LARYNGOSCOPY IN PEDIATRICS

ONE SIZE DOES NOT FIT ALL - EXPAND YOUR TOOLBOX

Video laryngoscopy provides significant advantages in managing complex pediatric airways. VL may offer a clearer view of the glottis and can enhance your first-pass success. Neonatal sizing is available for devices like the Glidescope and CMAC, and selecting the right tools based on age and weight will prepare you for success. Let us guide you through some key benefits and skills you will need to master the video laryngoscope.

A systematic review and meta-analysis published in November 2024 analyzed 13 randomized controlled trials involving 1,721 patients. The findings indicated that VL improved first-attempt intubation success rates in both neonates and infants compared to direct laryngoscopy.(DL).

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PEDIATRIC BLADES FOR THE GLIDESCOPE

310 PED

CORE KNOWLEDGE

MEDICATE TO INTUBATE

RSI Medications for the Critically Ill Child

Critically ill children who need RSI have different requirements. First, general airway principles still apply! Use the Vortex approach. Plan for the possibility of failure. Resuscitate before you intubate when possible. Consider that a critically ill child may go into cardiac arrest or a compromised hemodynamic state may worsen during the much needed intubation. When choosing RSI medications, use the medication profile to your advantage. In the critically ill child decrease the sedative dose in order to avoid compromising an already delicate hemodynamic state. Increase the paralytic dose to account for decreased perfusion.

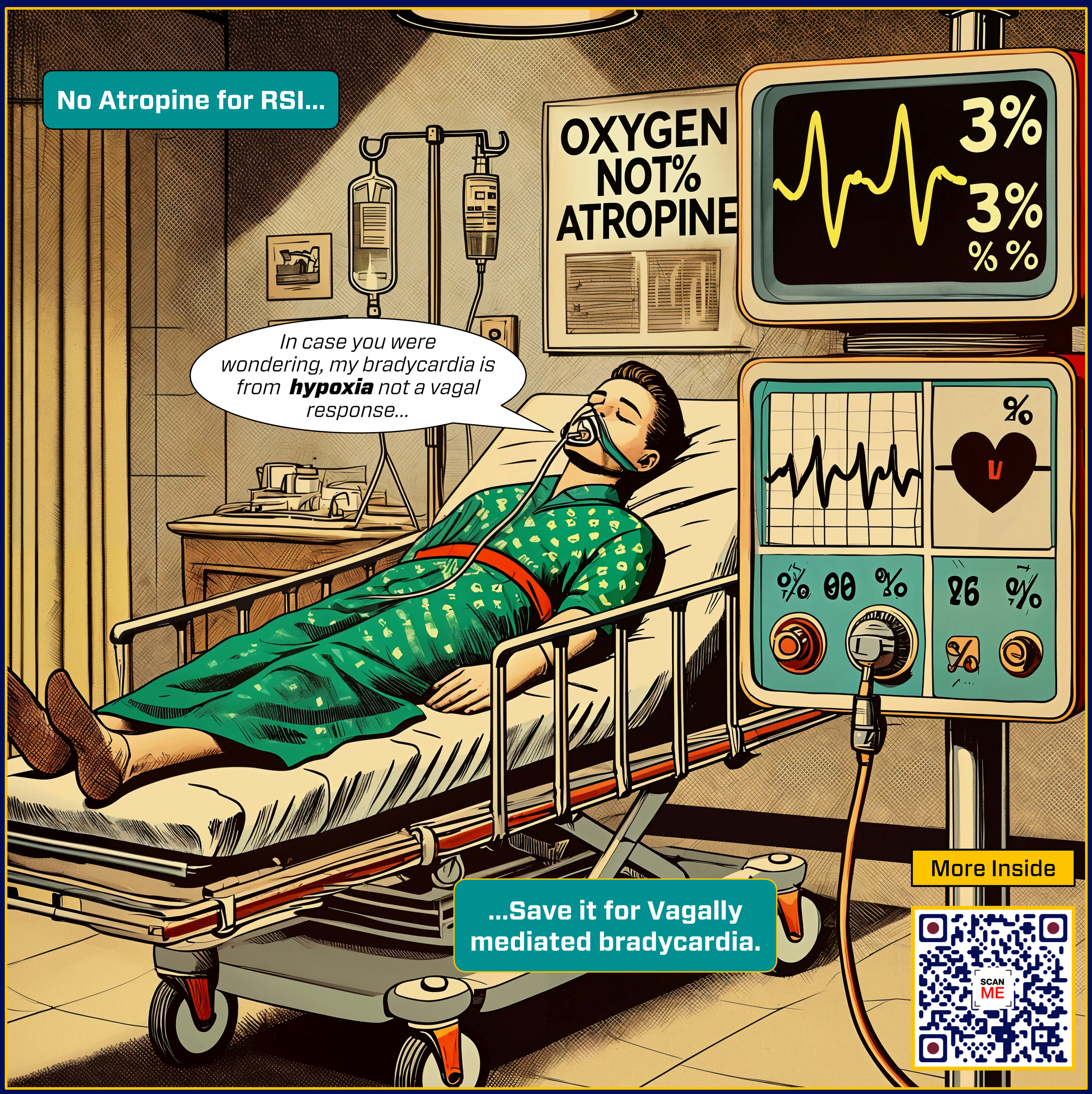
311 PED

PRACTICE CHANGING

BRADYCARDIA ≠ ATROPINE

INSTEAD THINK *HYPOXEMIA* AND CORRECT IT

Atropine is no longer routinely used in children who need an advanced airway. The thought was that atropine could prevent vagally mediated BRADYCARDIA. However, most of the bradycardia that occurs during RSI is due to HYPOXEMIA... which atropine will NOT correct. Eliminating atropine from the standard RSI equation helps streamline pediatric RSI, reducing the opportunities for errors and delays that can lead to hypoxemia. Atropine should be considered in bradycardia secondary to vaguely mediated responses. In a child with respiratory distress, bradycardia signals imminent cardiopulmonary arrest and you need to act immediately!



312 PED MUSICAL INTERLUDE

PAC CREATIVE COLLABORATIONS INCLUDE MUSICAL ONES. DR. GILMAN IS A PAC FACULTY MEMBER, AND HIS MUSIC EARNED HIM FIRST PLACE AT SAEM'S GOT TALENT IN 2019 AND HAS BEEN WIDELY VIEWED ON YOUTUBE. DR GILMAN HAS USED HIS LYRICAL MASTERY TO EDUCATE AND ADVOCATE ABOUT TOPICS SUCH AS PHYSICIAN WELLNESS, HEALTH POLICY, AND THIS ONE ON MANAGING THE PEDIATRIC AIRWAY. TAKE A MUSICAL INTERLUDE HERE.

PAC RAP

CLEAVON MD

LISTEN HERE

313 PED ADVANCED TRAINING

THE DIFFICULT PEDIATRIC AIRWAY

HOW TO PREPARE & MANAGE DIFFCULTY

When you encounter challenges maintaining adequate ventilation or performing intubation in a child, things can get complicated. These challenges can arise due to anatomical, physiological, or pathological factors unique to children, making airway management more complex than in adults. Several factors play a role: age under one year, relative weight, upper airway obstruction, and congenital malformations make the pediatric airway challenging to manage. Let's talk about the ***pediatric*** difficult airway.

BOTTOM LINE: When facing a difficult airway, your objective is clear: oxygenation, not intubation. Ensure you have set yourself up for first-past success. Understand the differences and difficulties in the pediatric airway. Plan for the possibility of failure. Once a technique fails, a change in direction is needed so have a good backup plan.

314 PED

CORE KNOWLEDGE

FACIAL MALDEVELOPMENT

HOW TO MANAGE THESE UNIQUE CHALLENGES

Congenital conditions characterized by abnormalities typically occurring together can often impact the airway. Micrognathia, Glossoptosis, and other maxillofacial abnormalities can lead to breathing difficulties and a challenging airway to manage. In these situations, Difficult Airway Principles Apply! Remember to escalate early! Direct laryngoscopy may be difficult or impossible. Ensure a Supraglottic Device (LMA) & Video Laryngoscope are in your toolbox. Upper airway obstruction is expected as congenital airway abnormalities are not static. Let's review all this here.

Down syndrome

Micrognathia

Treacher Collins

Glossoptosis

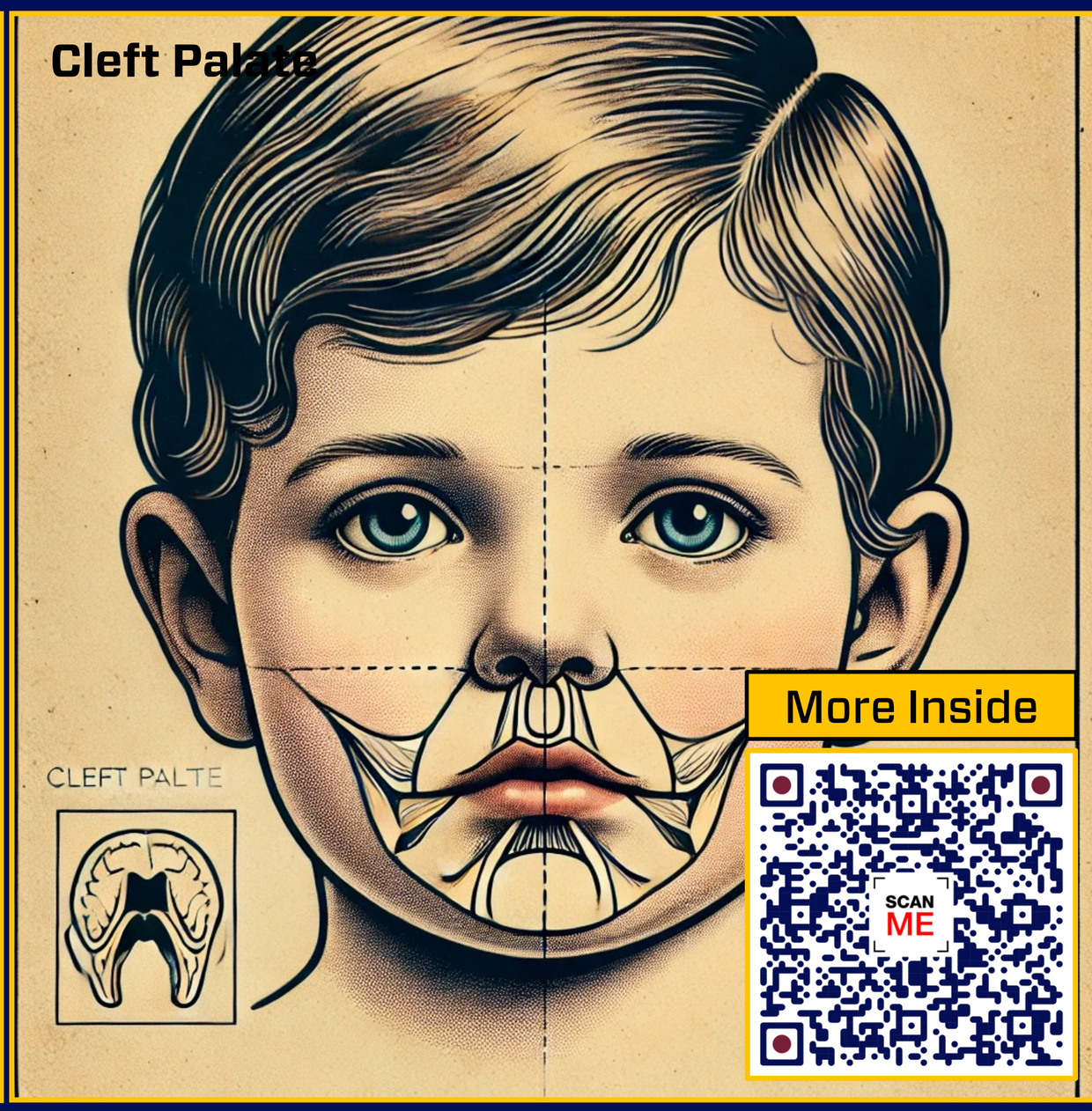
Beckwith-Wiedemann syndrome

Crouzon Syndrome

Pierre Robin Sequence

Airway Obstruction

Cleft Palate



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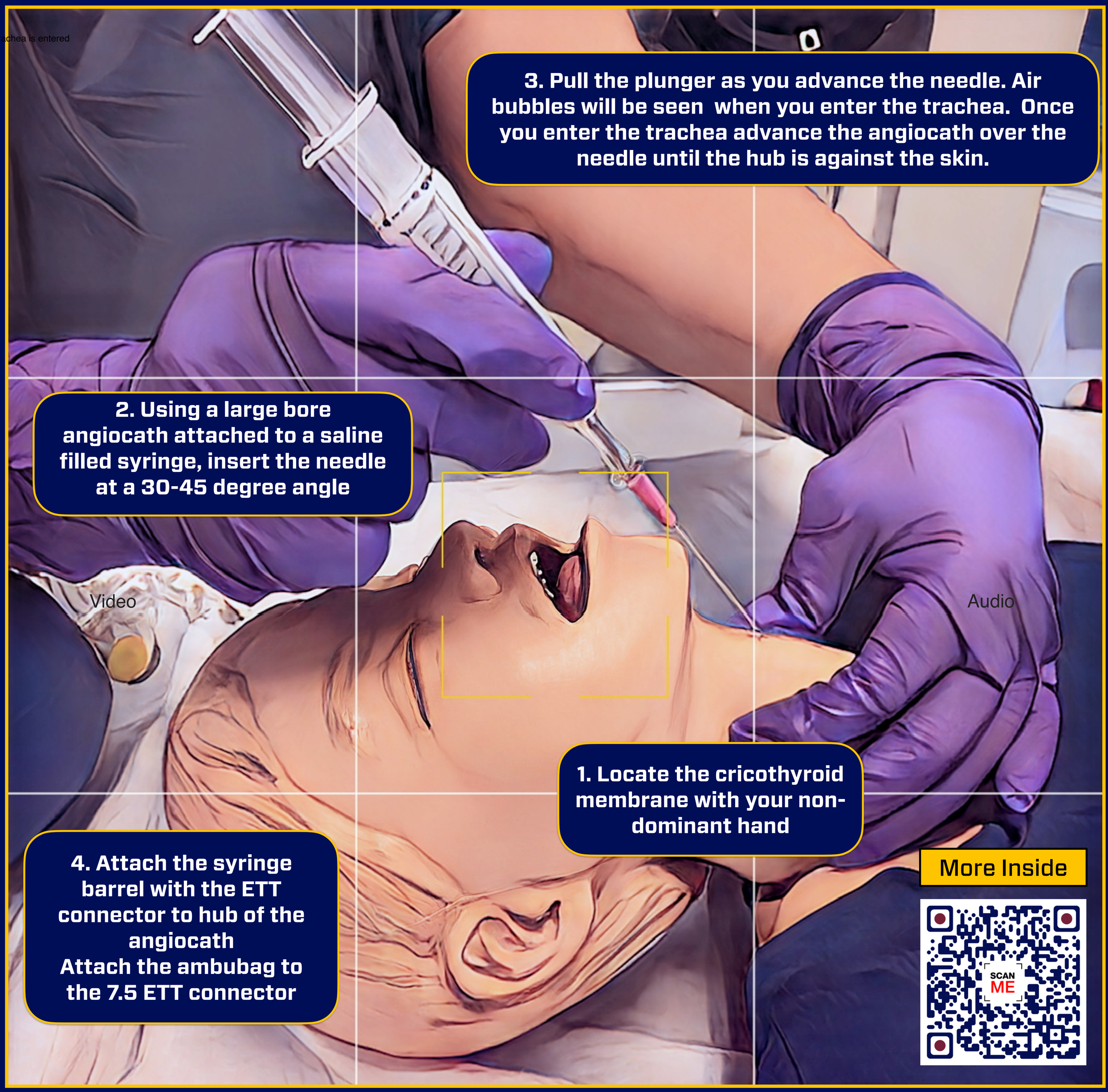
315 PED

CRITICAL SKILL

FRONT OF NECK ACCESS

THE PEDIATRIC EDITION

In the “Can’t Intubate, Can’t Oxygenate” (CICO) scenario, you may be tempted to think: scalpel, finger, bougie. NOT SO FAST! For children under the ages of 10-12, this technique is not recommended! In pediatric patients, needle ventilation is typically performed when there is a critical upper airway obstruction, and traditional ventilation methods are impossible or have failed. This could occur due to severe trauma, airway edema, or other life-threatening conditions that compromise the patient's ability to breathe. In this space, we discuss when you need to rapidly advance your airway plan to this strategy and walk you through the procedure. Let’s get started.



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