

Outline	Slide	Speech
• Title	Slide 1	Good morning, I'm Dr Charles Bruen. Staff Physician in the Department of Critical Care and Emergency Medicine, and I would like to talk with you about the pediatric airway for a few minutes.
• Disclosure	Slide 2	No disclosures. No off label use.
• Blank	Slide 3	I remember my first pediatric stab case early in residency. A 3-year-old that had been found arrested. Paramedics were bringing him in lights & sirens. I was terrified as we waited. The faculty on the case said (in an attempt to build up my confidence I think)...
• Quote	Slide 4	"Dont worry, children are easy to intubate" Hah! I am still traumatized by that airway. Forget the back-and-forth debate of whether kids are little adults or not. Its nonsense.
▼ Alien	Slide 5	The right question is are they human?
▼ Weird	Slide 6	They are weird.
▶ Anatomical differences	Slide 7	The have a large head relative to their body, specifically the occiput. Their tongues are abnormally large. The larynx is anterior. The epiglottis is hard narrow, omega shaped, and protrudes over larynx at 45 degrees. Short trachea.
▼ Metabolic differences		They have different metabolism.
• Oxygen demands		Higher metabolic oxygen use which causes them to desaturate quicker.
• Low FRC		Their lungs also have a lower FRC, decreasing their oxygen reservoir also leading to quicker desaturations.
• Mutant	Slide 8	They are mutants. Rapidly change over weeks, months, and years. There is no pediatric airway. There is a neonate airway. A 1 yr old airway. A 2 year old airway. Etc. By age 10 they generally behave like adults.
▶ Rare	Slide 9	Sick kids needing intubation are rare. We don't see them often. About 100x fewer than adults.
• Scary	Slide 10	They scare us. We are desperate and terrified not to make a mistake. And we don't have any confidence in our skills.
▼ Master	Slide 11	We need to become masters without the benefit of repetition.
▼ Know Your equipment		You need to know your equipment.
▼ Direct laryngoscopes	Slide 12	Standard Macgill and Macintosh laryngoscope blades in pediatric sizes — 0, 1, 1.5, 2, etc.
• Wis-Hipple	Slide 13	There are speciality blades for 0-1 year olds, such as the Wis-Hipple. An adaptation of a Macgill blade with a wider slightly curved tip to control the epiglottis and more complete C-channel.
• Robert-Shaw	Slide 14	The Robert-Shaw blade that has a wide base for controlling the tongue that tapers into a gentle curve that works above or below the epiglottis.

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▼ Video laryngoscope		There have been two big revolutions in the management of the pediatric airway. The first has been the introduction of video laryngoscopy.
• Airtraq	Slide 15	This can range from optical paths such as the Airtraq.
• Glidescope	Slide 16	Or the Glide scope
• C-Mac	Slide 17	or Storz C-Mac system. Both come in pediatric sizes down to size 0. In numerous comparison trials in pediatric elective surgical and emergent intubations, the rate of first pass success, ultimate intubation success, and airway trauma are all improve with video laryngoscopy.
• Endoscope	Slide 18	The video systems have been extended to pediatric bronchoscopes and intubating endoscopes which facilitate awake intubations and intubating through an LMA.
▼ Supraglottic		
▼ air-Q	Slide 19	The second major development, is the success of supraglottic airways. They are easy to use, and have high success rates. The air-Q made by Cook Gas, is in intubating supraglottic airway.
•	Slide 20	It has a large central opening in the cup that also passage of an endotracheal tube either by itself or over a catheter or endoscope.
▼ LMA Supreme	Slide 21	The LMA supreme is a non-intubating LMA,
•	Slide 22	but has a distal gastric port that can pass a gastric tube to decompress the stomach.
• LMA Fastrac	Slide 23	The LMA Fastrac, reusable intubating LMA is available down to size 3, so can be used in larger kids.
▼ TTNV	Slide 24	Know how to use your TTNV setup. Do you know how to use the transtracheal catheter and
•	Slide 25	insufflation equipment.
▼ Know your environment	Slide 26	You must be familiar with your environment, the room you practice in. Know where everything is in the room.
• Airway cart	Slide 27	Where are items in the airway cart. Check it. And there must be a system in place to regularly check it and keep it stocked.
▼ Know your Reference		You have to have a pediatric reference and know how to use it. Detailed equipment sizing and medication dosing.
• Broselow	Slide 28	The Broselow tape is very good with a length based determination of sizing leading to color coded equipment.
▼ Tsai	Slide 29	Dr Albert Tsai also publishes a drug reference that has
•	Slide 30	very hand use sizing, normal values, and medication dosing on single page references.
• Know you algorithms	Slide 31	You have to know your algorithms. How are you going to approach the patient.

Outline	Slide	Speech
<ul style="list-style-type: none"> <li>▼ Practice                             <ul style="list-style-type: none"> <li>• Mental rehearsal</li> <li>• Manikan</li> <li>• Simluation</li> </ul> </li> </ul>	Slide 32	<p>No mastery comes without practice.</p> <p>This starts with mental rehearsal.</p> <p>Mannequin practice with the equipment.</p> <p>and scenario high-fidelity team simulation with your real equipment, and if possible in your actual stab room.</p>
<ul style="list-style-type: none"> <li>▼ Predict                             <ul style="list-style-type: none"> <li>• Crashing?</li> <li>• Difficult intubation?</li> <li>• Difficult mask ventilation?</li> </ul> </li> <li>▼ LEMON                             <ul style="list-style-type: none"> <li>• L</li> <li>• E</li> <li>• M</li> <li>• O</li> <li>• N</li> </ul> </li> </ul>	Slide 33	<p>You have mastered and practiced. When the sick child needing intubation arrives, you need to answer three questions to fit them into your algorithm pattern.</p> <p>Is the patient crashing. Do you need an immediate airway.</p> <p>Is intubation going to be difficult?</p> <p>Difficult mask ventilation?</p> <p>Children won't often cooperate with exam, but as much as you can LEMON is a good acronym to use.</p> <p>Look for blood, vomit, facial trauma, congenital abnormalities.</p> <p>Evaluate 3-3-2. Use the child's fingers, yours.</p> <p>Mallampati score.</p> <p>Other obstruction. Foreign body.</p> <p>Stiff neck or cervical collar.</p>
<ul style="list-style-type: none"> <li>▼ Plan                             <ul style="list-style-type: none"> <li>• Create a plan — Initial approach, backup, second backup</li> </ul> </li> </ul>	Slide 34	<p>Taking everything into account, plan your initial approach, backup, second backup, failure scenario.</p>
<ul style="list-style-type: none"> <li>▶ Prepare</li> </ul>	Slide 35	<p>Prepare for the intubation. Optimize position. Calm them down if you can. Pre oxygenate. Premeditate. Volume loading if needed in trauma for circulatory support.</p>
<ul style="list-style-type: none"> <li>▼ Perform                             <ul style="list-style-type: none"> <li>• Unanticipated difficult intubation</li> </ul> </li> </ul>	Slide 36	<p>I can't walk you through the all of the algorithms, but lets talk about two of them so we can understand the approach and equipment.</p>
<ul style="list-style-type: none"> <li>▶ If mask ventilation becomes difficult</li> </ul>	Slide 37	<p>You did not predict any difficulty, and proceeded with laryngoscopy (either direct or video) as your first approach. However, you had a poor visualization and could not intubate the child. You stop your attempt to bag, which is easy. Check for positioning, equipment, and reassess anatomy. If your second attempt fails, this would be a reasonable time to use a intubating supraglottic airway, such as the air-Q and your intubating endoscope.</p>
	Slide 38	<p>The second scenario. You are bagging between attempts or with a supraglottic airway, and the child becomes difficult to mask ventilate. Check equipment. Try chin lift/jaw thrust. Shoulder roll. Cricoid pressure. Is the tongue obstructing or the neck flexed. Insert a nasal or oral airway. But don't forget functional causes which are quite common.</p>

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• Summary		Insufficient anesthesia, sedation. Laryngospasm, may need to paralyze. Bronchospasm, epinephrine. Gastric insufflation can impede ventilation and may need to be decompressed, a good use of the LMA Supreme. Trauma patient, pneumothorax? Attempt two-handed mask ventilation. Additional sedation. SGA. Paralyze. If decompensates, proceed to CICV algorithm.
• Closing		A would like you take home a couple of points today. Video laryngoscopy and supraglottic airways are making the pediatric airway more successful and safer. But because it is rare, need to master your tools, practice, and prepare.  Thank you very much.