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PEDIATRIC ALTERNATIVE AIRWAYS: WHAT YOU NEED TO KNOW AND WHERE TO FIND IT

The first of a two-part series looks at colors, cuffs, and CO_2

By Scott DeBoer, RN, MSN, CEN, CPEN, CCRN, CFRN, EMT-P; Michael Rushing, NRP, RN, BSN, CEN, CPEN, CFRN, TCRN, CCRN-CMC; Lisa DeBoer; and Michael Seaver, RN, BA

Backup airways. Alternative airways. Rescue airways. Whatever we call them, we should know about them, have them, and use them. But do we know what we really need to know? In our ongoing experiences with both novice and experienced EMS practitioners, when it comes to alternative airways for pediatric patients, the answer too often is no. However, this is a potential shortfall in our education and training that can be easily remedied.

We spend hours and hours perfecting our craft in intubation, but how much time do we spend learning about backup airway devices? Have you ever actually looked at the package insert or viewed the instructions? In actual practice we commonly base our use of devices on our training, which doesn't always reflect the manufacturer's recommendations.

The truth is out there when it comes to these lifesaving devices. There is also much misinformation and many misconceptions that can be easily corrected, if one knows where to look. It would be nice if critical information like what size airway is suggested for what size patient and how much air should be used to inflate the balloon(s) were available in the same way with each type of device, but that's not the case. So with that in mind, let's review the essential questions that come up with the most commonly utilized pediatric emergency alternative airways.

Standardized Colors

It's crucial to remember that the colors of the tops of alternative airways do not correlate to the Broselow-Luten or Handtevy systems. Three veterans of pediatric care—Robert Luten, MD, cocreator of the Broselow-Luten system; Peter Antevy, MD, creator of the Handtevy system; and educator Scott DeBoer, lead author of this article—created charts based on manufacturers' sizing recommendations that describe what color is for what size pediatric alternative airway (for Ambu's King and AuraGain, Mercury Medical's air-Q sp, Teleflex's LMA Supreme, and Intersurgical's i-gel).

These guides were provided to each of these manufacturers in the fall of 2017, and we hope in the future all manufacturers of alternative airways will embrace the inherent safety advantages of a standardized color-coded approach.

Verifying Placement

As with endotracheal tubes, it is always advisable to confirm proper placement of an airway adjunct. Short of having x-ray vision, the most reliable techniques involve assessing the presence of carbon dioxide in exhaled air. And do these colorimetric and capnographic devices work with a King airway, LMA, or i-gel? Absolutely!

Quite simply, air goes in and out of these airways (and hopefully your patient's lungs) just like with an endotracheal tube. Confirming correct placement, both initially and on an ongoing basis, can be done with a colorimetric indicator or, preferably, waveform capnography. The standard of care is to monitor CO_2 with any endotracheal tube placement, so you can and should monitor exhaled carbon dioxide with any alternative airway to confirm placement as well.

Taking the Pressure

We know most ET tubes have an inflatable cuff to help secure placement and minimize air leakage. The same is true for many alternative airways. If a cuff is present, we want to inflate it with the recommended amount of air (more on where to find that in our next article).

In addition to inflating the cuff (if present) with the amount of air detailed in the manufacturer's instructions, another common option, especially in the hospital, is the use of cuff pressure manometers. Commonly used in anesthesia and intensive care units to monitor endotracheal tube pressures, these are now becoming more utilized in critical transport and EMS as well, and with good reason: Research shows that, as a rule, providers tend to seriously overinflate the cuffs of endotracheal tubes. They may be even more likely to overinflate the balloons/masks of alternative airways to ensure a proper seal. However, published research details complications associated with overinflation, including the potential for damage and necrosis to surrounding airway tissues.

Inflation guidelines—i.e., the amounts of air listed on the tube or package—are just guidelines. Some patients' airways need more, and of course some need less. The syringe size on the tube or package is a nice way to tailor what size syringe to use for inflation—i.e., don't hook a 60-mL syringe to an infant-size King airway. Interestingly, the same manometers utilized in the hospital setting for endotracheal tubes can be used for monitoring alternative airways as well. It's the same toy, just for different tubes!

In our next article we'll look at where to find information on alternative airway devices.

ABOUT THE AUTHORS

Scott DeBoer, RN, MSN, CPEN, CEN, CCRN, CFRN, EMT-P, is an international pediatric seminar leader and nurse consultant with more than 30 years of nursing experience. He retired from flight nursing in 2015 following more than 20 years with the University of Chicago Hospitals' UCAN flight team. He is the founder and primary seminar leader for Pedi-Ed-Trics Emergency Medical Solutions.

Michael Rushing, NRP, RN, BSN, CEN, CPEN, CFRN, TCRN, CCRN-CMC, is AHA coordinator for Baptist Health Care, Pensacola, Fla., and paramedic adjunct professor at Northwest Florida State College, Niceville, Fla.

Lisa DeBoer is president and cofounder of Pedi-Ed-Trics Emergency Medical Solutions.

Michael Seaver, RN, BA, is a healthcare informatics consultant based in Chicago.

Broselow-Luten System

www.ebroselow.com

Developed by Robert Luten, MD, & Scott DeBoer, RN, MSN, Sept. 2017

Broselow-Luten Color	Broselow-Luten Ideal Body Weights & Patient Height	*Ambu* King LTS-D size & *Gastric access tube size*	*Ambu* Aura Gain size & *Gastric access tube size*	*Mercury Medical* Air-Q sp size **NO gastric access*	*Teleflex* LMA Supreme size & *Gastric access tube size*	*Intersurgical* i-gel size *(Currently used internationally, but not approved for pediatric resuscitation in the US)* & *Gastric access tube size*
Grey	3-5 kg (46-60 cm)	0 *10 Fr	1 *6 Fr	1/2 - 1	1 *6 Fr	1 *NO gastric access
Pink	6-7 kg (60-67 cm)	1 *10 Fr	1 1/2 *8 Fr	1	1 1/2 *6 Fr	1 ½ *10 Fr
Red	8-9 kg (67-75 cm)	1 *10 Fr	1 1/2 *8 Fr	1 1/2	1 1/2 *6 Fr	1 ½ *10 Fr
Purple	10-11 kg (75-84 cm)	1 *10 Fr	2 *10 Fr	1 1/2	2 *6 Fr	1 ½ *10 Fr
Yellow	12-14 kg (84-97 cm)	2 *16 Fr	2 *10 Fr	1 1/2	2 *10 Fr	2 *10 Fr
White	15-18 kg (97-110 cm)	2 *16 Fr	2 *10 Fr	1 1/2	2 *10 Fr	2 *10 Fr
Blue	19-23 kg (110-122 cm)	2 1/2 *16 Fr	2 1/2 *10 Fr	2	2 *10 Fr	2 *10 Fr
Orange	24-29 kg (122-134 cm)	2 1/2 *16 Fr	2 1/2 *10 Fr	2	2 1/2 *10 Fr	2 ½ *10 Fr
Green	30-36 kg (134-147 cm)	3 *18 Fr	3 *16 Fr	2 1/2	3 *14 Fr	2 1/2 – 3 *12 Fr

Handtevy System

www.handtevy.com

Developed by Peter Antevy, MD, & Scott DeBoer, RN, MSN, Dec. 2017

Handtevy Color	Handtevy Age, Ideal Body Weights & Patient Height	*Ambu* King LTS-D size & *Gastric access tube size*	*Ambu* Aura Gain size & *Gastric access tube size*	*Mercury Medical* Air-Q sp size **NO gastric access*	*Teleflex* LMA Supreme size & *Gastric access tube size*	*Intersurgical* i-gel size *(Currently used internationally, but not approved for pediatric resuscitation in the US)* & *Gastric access tube size*
Grey	Preemie (2 kg) 45.5-48.5 cm	0 *10 Fr	1 *6 Fr	1/2	1 *6 Fr	1 *NO gastric access
Grey	Newborn (3-5 kg) 48.5-59.5 cm	0 *10 Fr	1 *6 Fr	1/2 - 1	1 *6 Fr	1 *10 Fr
Pink	4-months (6 kg) 59.5-67 cm	1 *10 Fr	1 1/2 *8 Fr	1	1 1/2 *6 Fr	1 ½ *10 Fr
Red	6-months (8 kg) 67-74 cm	1 *10 Fr	1 1/2 *8 Fr	1 1/2	1 1/2 *6 Fr	1 ½ *10 Fr
Purple	1-year (10 kg) 74-83.5 cm	1 *10 Fr	2 *10 Fr	1 1/2	2 *10 Fr	1 ½ *10 Fr
Yellow	2-years (12 kg) 83.5-95 cm	2 *16 Fr	2 *10 Fr	1 1/2	2 *10 Fr	2 *10 Fr
White	3-4 years (15-17 kg) 95-108 cm	2 *16 Fr	2 *10 Fr	1 1/2	2 *10 Fr	2 *10 Fr
Blue	5-6 years (20-22 kg) 108-121.5 cm	2 1/2 *16 Fr	2 1/2 *10 Fr	2	2 *10 Fr	2 *10 Fr
Orange	7-8 years (25-27 kg) 121.5-131 cm	2 1/2 *16 Fr	2 1/2 *10 Fr	2	2 1/2 *10 Fr	2 ½ *10 Fr
Green	9-13 years (30-60 kg) 131-162 cm	3-4 *18 Fr	3-4 *16 Fr	2 1/2 - 3 1/2	3-4 *14 Fr	3-4 *12 Fr

For printable PDFs of these airway/color charts, see PediEd.com/airwaycharts.

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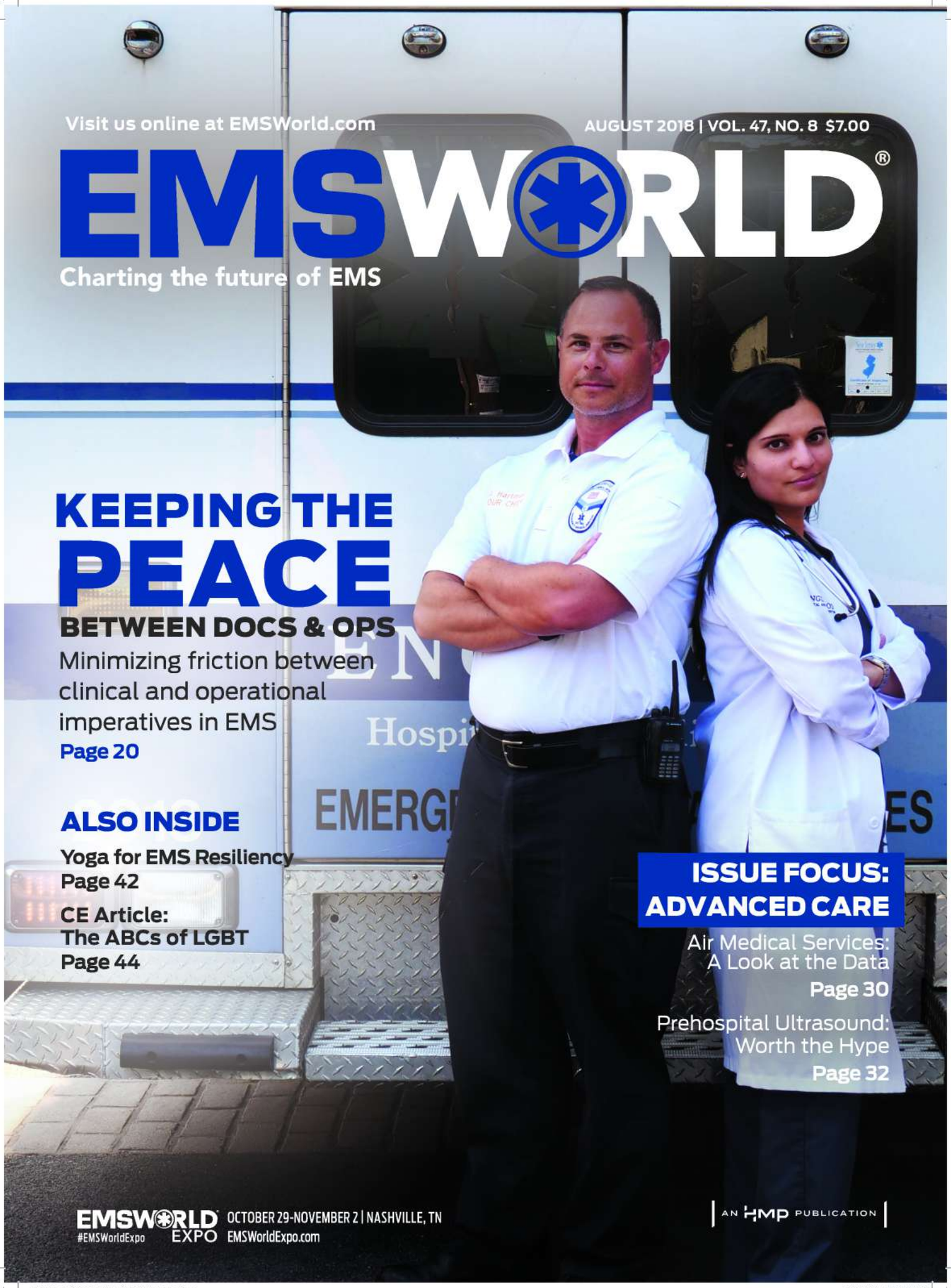

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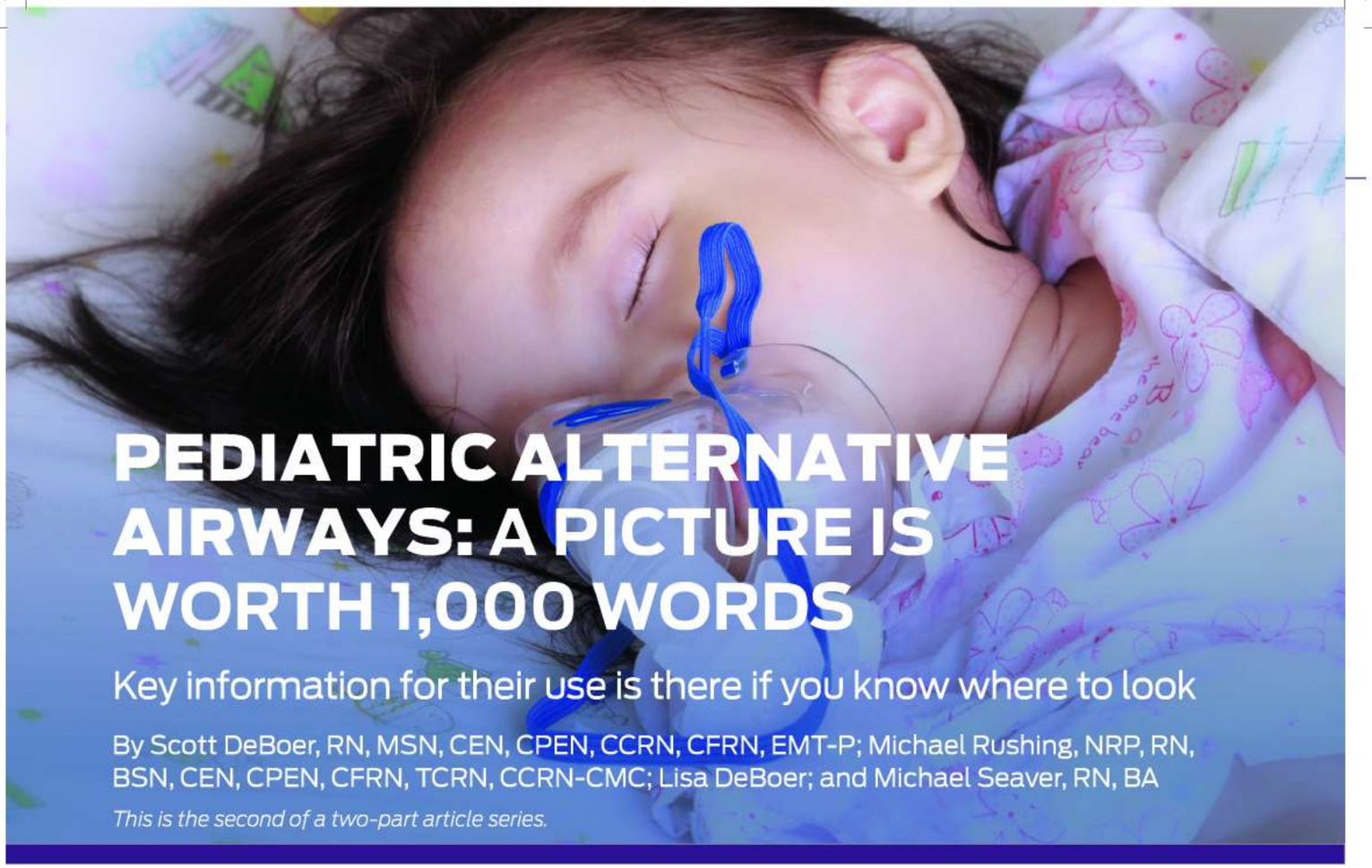


PEDIATRIC ALTERNATIVE AIRWAYS: A PICTURE IS WORTH 1,000 WORDS

Key information for their use is there if you know where to look

By Scott DeBoer, RN, MSN, CEN, CPEN, CCRN, CFRN, EMT-P; Michael Rushing, NRP, RN, BSN, CEN, CPEN, CFRN, TCRN, CCRN-CMC; Lisa DeBoer; and Michael Seaver, RN, BA

This is the second of a two-part article series.

In last month's article we looked at what types of information we need to consider when using pediatric alternative airways. They say a picture is worth 1,000 words, so let's take an in-depth look at where that critical information can be found. Sometimes we just need to pay attention to the instructions!

King Airways/Laryngeal Tubes (Ambu)

Sizes for King LTS-D airways range from babies (<5 kg) to big people. Note: Contrary to appearances, the colors on the tops of King airways do not correspond to designations of the Broselow-Luten or Handtevy systems.

The packaging for the King LTS-D airway indicates:

1. The corresponding Broselow-Luten color codes based on head-to-heels measurement;
2. Recommendation for use based on patient weight range (in kg);
3. Recommended cuff inflation in milliliters of air.

The front of the King LTS-D airway allows you to confirm:

4. Recommendation for use based on patient weight range (in kg);
5. Recommended cuff inflation in milliliters of air.

The back of the King LTS-D airway indicates:

6. The size of the gastric access tube recommended.

AuraGain Laryngeal Mask Airways (Ambu)

Sizes for AuraGain laryngeal mask airways range from babies (<5 kg) to big people.

The packaging for the AuraGain airway indicates:

1. Recommendation for use based on patient weight range (in kg);
2. The size of the gastric access tube recommended;
3. Recommended cuff inflation in milliliters of air.

The side of the AuraGain airway indicates:

4. The size of the gastric access tube recommended.

The pilot balloon of the AuraGain airway indicates:

5. Recommendation for use based on patient weight range (in kg);
6. Recommended cuff inflation in milliliters of air.

air-Q sp Masked Laryngeal Airways (Mercury Medical)

Sizes for air-Q sp masked laryngeal airways range from babies (<4 kg) to big people. Note: Contrary to appearances, the colors on the tops of air-Q sp airways do not correspond to the Broselow-Luten or Handtevy systems.

The packaging for the air-Q sp airway indicates:

1. Recommendation for use based on patient weight range (in kg).

The back of the air-Q sp airway indicates:

2. Recommendation for use based on patient weight range (in kg).

Note: No cuff inflation is needed with this device.

LMA Supreme (Teleflex)

Sizes for LMA Supremes range from babies (<5 kg) to big people.

The packaging for the LMA Supreme airway indicates:

1. Recommendation for use based on

patient weight range (in kg);

2. Recommended cuff inflation in milliliters of air.

The front of the LMA Supreme airway indicates:

3. Recommendation for use based on patient weight range (in kg);

4. Recommended cuff inflation in milliliters of air.

Note: The size of the gastric access tube recommended is found in the "instructions for use" available on the Teleflex website.

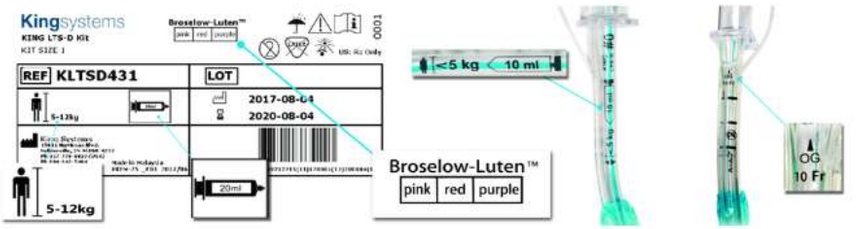
i-gels (Intersurgical)

i-gel airways are similar to other laryngeal mask airways in many respects, but a significant difference is that they are made of a flexible silicone-like material that does not require inflation. In countries outside the United States, i-gels are used extensively in both prehospital and hospital-based care of children and adults.

Intersurgical, the manufacturer of i-gels, has indicated pediatric i-gels are not yet approved for prehospital/emergency resuscitation use in the United States. Intersurgical says it's working toward obtaining U.S. pediatric i-gel approval; however, at this time any prehospital services using them with children should do so only under approval of their medical director.

Conclusion

So what's the takeaway message? When selecting and using pediatric alternative airways, the information is out there. You just have to know where to look and then read the directions before all else fails.



Close inspection of these devices reveals sizing and procedural instructions. Courtesy PediEd.com/airwaycharts

MORE ONLINE!

For Part 1 of this series visit www.emsworld.com/article/220734

ABOUT THE AUTHORS

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