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Breathing for Babies

Before you start breathing for a newborn, take a deep breath for yourself

The presentation of a newborn to EMS personnel often causes a great deal of stress. What size equipment to use, and how hard and how fast to “bag” are just two of the issues that can cause concern. This article reviews special considerations, techniques and equipment required for managing respiratory resuscitation of newborns in emergency situations.

In Samuel Shem’s book *The House of God*, which describes the experiences of physicians in training, one of the most poignant principles states: “At a cardiac arrest, the first procedure is to check your own pulse.”¹ The same idea holds true when called upon to assist in the resuscitation of newborns. Happily, “at least 90% of newly born babies make the transition from intrauterine to extrauterine life without difficulty.”² However, if faced with that less than 10% likelihood of complications, in addition to checking your own pulse, it is advisable to check your own breathing. Take a deep breath, try to relax, and then—and only then—breathe for the baby.

QUESTIONS TO ASK

If the baby isn’t breathing, what should you do?

In the real estate business, the mantra is “location, location, location.” In the newborn resuscitation business, you will do well to remember “position, position, position.” Babies have an anatomical phenomenon often referred to as the “big head, little body syndrome.” Laying them supine may force their chin onto their chest and result in

less-than-optimal airway positioning. A simple remedy to this situation is to quickly place something like a diaper or small towel roll under the shoulders to offset the big head and produce better airway alignment, hence better positioning.^{3,4}

You’ve repositioned the baby, but he is still not breathing. What else can you do?

Think about basic CPR. Try to stimulate him to see if you get any response or reaction. No one advocates shaking the baby, as it may be harmful. (Though not the focus of this article, the Neonatal Resuscitation Program [NRP] textbook provides an excellent review of the “beyond bagging” resuscitation process, including CPR and medications for newborns.²)

Acceptable stimulation methods include lightly flicking the soles of the feet or gently rubbing the newborn’s back. A brief trial of stimulation is recommended, but the emphasis is on brief. If the baby is still not breathing on his own, it is time to start breathing for him.^{3,4}

If there is no equipment handy, cover the baby’s mouth

“Anywhere you go with a patient, whether intubated or on room air, bring a bag and mask.”

and nose with your mouth and provide gentle “puffs” of breath. Provide only enough air to see the baby’s chest rise and fall.^{5,6}

The NRP teaches 40–60 assisted breaths per minute for newborns. Once assisted ventilations have been initiated, if the baby is still apneic, chest compressions and, rarely, medications may be required.^{5,6}

The baby still isn’t breathing well (or at all) and you have equipment available. What do you need to consider before using it?

If it’s “baby” equipment, use it. If not, get it!

What’s the difference between pediatric and adult breathing equipment?

Bag size is important! This is a newborn baby, and improper ventilations can hurt him. It is

recommended to use a pediatric bag, especially with preemies. The bags have some important differences, including size, which is much smaller than an adult bag, and the pop-off valve that helps you safely ventilate the baby. The size of the bag itself is

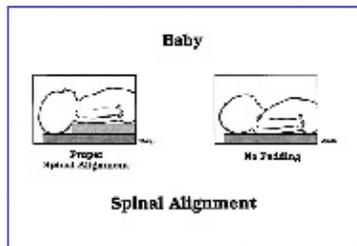


Figure 1: “Big head, little body syndrome.” Courtesy of Ossur Medical, www.ossur.com

a reminder to be gentle when using this special equipment.

When humans are stressed, they most often revert to what they know

best, which, in most emergency settings, is dealing with big people. With adults, we simply take a resuscitation bag in both hands and squeeze. But for newborns, this can be dangerous or even deadly, even if using a neonate or pediatric bag. The tidal volume (how much air goes in with each normal breath) for newborns is 6–8 mL/kg. Think about how big a 10 mL syringe is. That’s all the air it takes to make a very premature infant’s chest go up and down. Most “baby” resuscitation bags have a capacity of 240 mL; a “pediatric” bag capacity is generally 450–500 mL. This means there is still a large excess in either bag. To adjust for this, use only your thumbs or fingertips (that’s all it takes) on the bag to assist ventilations.^{5,6}

The NRP recommends the following to help control the speed of breathing for babies: Squeeze while saying



Figure 2: Size range of self-inflating resuscitation bags. Courtesy of Mercury Medical, www.mercurymed.com

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“one” and release on “two-three.”

If you're not successful with the 240 mL bag, you may need a “self-inflating” pediatric bag with a 450–500 mL capacity. In the OR and neonatal ICU environments, the “anesthesia” bag may be used by trained personnel; however, unless you have experience with this type of bag, we suggest you use the self-inflating bag like you use for adults.⁴⁻⁶

The pop-off valve is probably the most important neonatal resuscitation part of the smallest self-inflating bag. If you push too hard, the valve will “pop off” at pressures of 30–40 cm H₂O. The valve mechanism is designed to provide enough pressure to move the chest of all but the sickest newborn without allowing a hard squeeze that might result in a pneumothorax or barotrauma to the baby's lungs during manual ventilations.

In the event that more pressure is actually needed, a metal bar or plug attached to the bag can be engaged to defeat the pop-off valve. With the valve inoperable, greatly increased inspiratory pressures can be provided. In the EMS or ED settings, caution is recommended, as this extra pressure is very rarely needed. Our suggestion is to let the pop-off valve keep you and the baby safe.^{5,6}

An appropriately sized mask should always be part of the resuscitation equipment. Pediatric or infant resuscitation bags come with a mask that works well for most babies, but a smaller mask is often needed with premature newborns. If faced with a situation that requires you to care for a premature newborn and the only mask available is too big, flip the



Figure 3: Anesthesia bag. Courtesy of Mercury Medical, www.mercurymed.com

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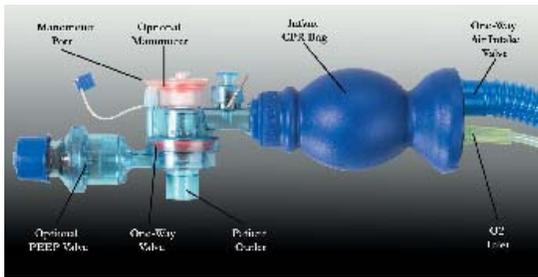


Figure 4: Baby-Bag. Courtesy of Mercury Medical, www.mercurymed.com

mask upside down so the nose part of the mask is on the baby's chin and vice versa. Always place your fingers on the bony prominences and away from the soft tissue areas, making sure the mask is not on or over the baby's eyes.^{5,6}

At 8–10 liters per minute flow, a self-inflating baby bag with a reservoir should deliver approximately 90%–100% oxygen. In EMS and the ED, 100% oxygen should be used for newborn resuscitation efforts,

unless a neonatologist or pediatrician specifically recommends otherwise.^{5–7}

In the neonatal ICU or delivery room, manometers are used to measure the amount of pressure being applied while ventilating the newborn. If you have one, use it. If not, use just enough pressure to make the chest gently rise and fall. Be aware that in newborn babies with “bad lungs,” it is not always possible or even desirable to obtain good chest rise. Neonatologists now teach that the best indications of adequate ventilations are improvements in heart rate, color and muscle tone. If the baby is looking better, keep doing what you are doing.^{5,6}

If you are doing all the things you've been told to do, you might be wondering why the baby's belly is getting big.

Just like with adults, when breathing for newborn babies, air can

go into two places. We want the air to go into the trachea and lungs, not the esophagus and stomach. With bag-mask ventilation, the abdomen can quickly become distended with air in the wrong place. This can seriously compromise ventilation efforts, but it is easily prevented or rectified with early placement of an appropriately sized nasogastric (NG) or orogastric (OG) tube connected to gentle syringe suction or open to air.^{5,6}

CONCLUSION

In summary, here is a recommendation gleaned from an anesthesia colleague: Anywhere you go with a patient, whether really sick or not so sick, intubated or on room air, bring a bag and mask. That way, if the patient stops breathing, you can effectively breathe for him.⁸ And remember, before you start breathing for a newborn, take a deep breath for yourself. ■



Figures 5 & 6: Baby-Bag with non-engaged and engaged pop-off valves. Courtesy of Mercury Medical, www.mercurymed.com

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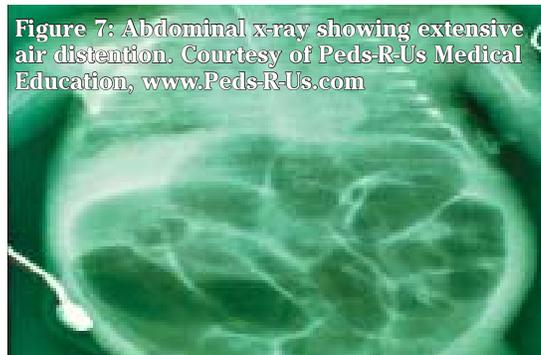


Figure 7: Abdominal x-ray showing extensive air distention. Courtesy of Peds-R-Us Medical Education, www.Peds-R-Us.com

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