Preemies to Preschoolers: Tubing Tiny Tots and Trauma FAQs, Part 1

This article is the first part of a 3-part series that will be published in the May, June, and September 2014 issues of JEN.

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"No animal is so inexhaustible as an excited infant." — *Amy Leslie*

In the wonderful world of emergency medicine and emergency medical services (EMS), few situations can test our skills and knowledge as much as a newborn or young child in need of ventilatory assistance. Part of the stress we experience is a direct result of not asking certain questions often enough to allow the answers to be readily available to us when we are most in need of them. The goal of this 3-part article is to review some frequently asked questions and provide answers or suggestions that are easily retrievable or obtainable when time is of the essence.

Positioning and Airway Management

BEFORE BAGGING, WHAT'S SO IMPORTANT ABOUT POSITIONING AND AIRWAY MANAGEMENT FOR LITTLE CHILDREN?

In real estate, the 3 most important things to remember are location, location, location. When considering airway management and little children, the 3 important words are positioning, positioning, positioning[1–3] (Figure 1). Newborns and infants have a natural anatomic condition we (the authors) often describe as "Big Head, Little Body Syndrome." Think about a 3-month-old boy with a big head who is flat on a spine board or sedated for a computed tomography scan. What does the child's big head do to his airway? It shoves his chin on his chest, and he does not breathe very well. What is the remedy? Simply putting a diaper or towel under the child's shoulders goes a long way to offset "Big Head, Little Body Syndrome."

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J Emerg Nurs 2014;40:279-81.

0099-1767/$36.00

http://dx.doi.org/10.1016/j.jen.2014.02.011

Terminology

WHAT IS THE DIFFERENCE BETWEEN GESTATIONAL TERMS SUCH AS "PRETERM," "FULL TERM," AND "NEONATE"?

Just as children are not simply small adults, newborns and infants are not simply small children. Newborns, from birth to 28 days of age, can be premature, early term, full term, late term, or post term. The American Congress of Obstetricians and Gynecologists provides the following current classifications[4]:

Preterm: Before 37 weeks 0 days
Early Term: Between 37 weeks 0 days and 38 weeks 6 days
Full Term: Between 39 weeks 0 days and 40 weeks 6 days
Late Term: Between 41 weeks 0 days and 41 weeks 6 days
Post Term: Beyond 42 weeks 0 days
Neonate: Birth to 30 days old
Infant: Birth to 1 year old
Toddler: 1 to 3 years old
Preschooler: 3 to 5 years old

Newborns of Known Gestational Age

IF I KNOW THE NEWBORN'S GESTATIONAL AGE, HOW WILL THAT HELP ME?

If the mom is pregnant and not only knows she is pregnant (which is not always the case) but also knows how far along she is (a tremendous benefit, indeed), you can start

FIGURE 1

Pediatric chin on chest positioning. Reprinted with permission from Ossur Americas, (Foothill Ranch, CA), http://www.ossur.com.

off by remembering that 40 weeks is ideal, and ideally a 4.0 endotracheal tube (ETT) is appropriate. Did you spot that relationship? Add a decimal point between the 2 numbers in the gestational age in weeks. If the infant is preterm, you can put in a decimal point between the 2 numbers of the gestational age in weeks and round up or down to the nearest size tube. For example, if you have reason to expect delivery of a preterm baby of 25 weeks gestation, put the decimal point between the 2 and the 5 and you can expect to need a 2.5 ETT. If the baby is 29 weeks along, put the decimal point between the 2 and the 9 and round the 2.9 up to the nearest size tube, a 3.0 ETT. A 32-week gestation newborn would also most likely need a 3.0 ETT (rounding down to the nearest size tube). For a 34-week or 37-week gestation newborn, use a 3.5 ETT. If the baby is 38 weeks or more in gestation, a 4.0 ETT will probably work best.

Reality check: Remember to treat the patient, not the numbers! If the numbers say preterm but you have a big baby, think 3.5 or even 4.0. Conversely, if the numbers say full term but you see a teeny, tiny infant, select a smaller tube. You will see more on this concept later.[5]

Inability to Determine Gestational Age

WHAT SHOULD I DO IF DELIVERY SEEMS IMMINENT AND THE MOTHER EITHER DOES NOT KNOW HOW FAR ALONG SHE IS OR IS UNABLE TO TELL ME?

In the unfortunate situation in which an emergency delivery is needed and the gestational age is unknown, one quick method for estimating tube sizes is simply this: If you can feel the uterus at the belly button (umbilicus) or above, this infant is potentially viable. That being said, it is also very likely that the baby will be very small and very sick, so think "preterm" if no other information is available. With a uterus palpable at the belly button or above, resuscitation is worth a try.

Viability

HOW "VERY SMALL" IS TOO SMALL?

> "*No fetus coming into the world before the seventh month of pregnancy can be saved.*" —Hippocrates, 460 B.C.

Although Hippocrates may be considered the father of modern medicine, this particular quote should no longer be considered good fatherly advice because we keep hearing about the survival of smaller and smaller babies. For EMS/ED caregivers, review and follow your system/hospital policies, protocols, and procedures. If a neonatology and/or pediatric resource person is quickly available, use his or her expertise. If not and the newborn looks and acts like a baby (even a very, very small baby), attempt resuscitation until persons with more experience tell you otherwise. A very wise and experienced neonatologist, Dr. Nancy Lass, summarized the answer to this question with the following statement: "Babies who are born too soon need to be put on a ventilator to live. If someone who can easily find baby vocal cords tries to put the smallest endotracheal tube into the trachea (not the esophagus) and the tube is still too big, that's God's way of saying the baby is just too small."

Equipment for Intubations

REGARDING INTUBATIONS, WHAT IS THE DIFFERENCE BETWEEN ADULTS AND THOSE WHO ARE NOT THE AGE (OR AT LEAST THE SIZE) OF ADULTS?

With regard to equipment, adults (and persons large enough to be adults) are easy to handle. Young or old, the vast majority will get a 7.5 or an 8.0 ETT. Newborns, infants, and even most children and their airways come in various sizes, and thus the equipment needed for intubation needs to come in various sizes. Read on, because it is not quite that easy.

ETT Size

HOW DO I FIGURE OUT WHAT SIZE ETT SHOULD BE PLACED IN A BABY?

Several methods can be used for determining the size of ETT that will most likely be needed for a newborn.

Weight

The American Academy of Pediatrics Neonatal Resuscitation Program teaches that ETT sizes can be calculated based on the weight of the infant.[6] This method works well if you

FIGURE 2

Pedi-Wheel pediatric "cheat sheet." (Photo courtesy of Peds-R-Us Medical Education; www.Peds-R-Us.com.)

resuscitate infants on a regular (daily/weekly) basis and have a scale immediately available. It might also work if you can guess newborn weights with decent accuracy. (This skill might also be useful if you want to pick up extra cash working at an amusement park.) Realistically, we think there has got to be a better way!

Formulas

Many of us remember a formula that would help determine pediatric ETT sizes. That formula might be expressed as [age divided by 4] + 4 or alternatively as [16 + age] divided by 4. Even though this formula works well for pediatric patients, how would it work with a preterm newborn? The age in this formula refers to years, but we are talking about weeks. For example, let's say you have a preterm, 32-week gestation newborn. If you are stressed and try to do the calculation as 32 divided by 4 (using weeks instead of years) plus 4, you would get 8 plus 4. This calculation would have you looking for a 12.0 ETT, which doesn't even exist! Here's a formula we have found that works: stressful situations + mental calculations = mistakes!

Make it Simple (Part 1)—TOTs, BOBs, and Leftovers

There are really only 3 types of babies: preterm, full term, and postterm. Another way we (the authors) look at this issue (and it works when we are not sure about gestational age) is to consider newborns as being either "Tiny Ol' Things" (TOTs), "Big Ol' Babies" (BOBs), or "Leftovers." Nurses can use this concept to assist us determine the size of the ETT needed.

TOTs look like the tiniest baby you have ever seen. These babies get the tiniest tube you can commonly find, which should be a 2.5 ETT. BOBs, who are big and chubby, get a 3.5 or 4.0 ETT. Leftovers—that is, babies between a TOT and a BOB—get the "leftover" tube (between a 2.5 and a 3.5), which is usually a 3.0 ETT.

Make it Simple (Part 2)—Charts

Simply put, GET ONE! A variety of charts are available to assist you during unusual and stressful emergency deliveries (Figure 2). Charts can be found for your smartphone, your pocket, your jump bag, or your cart. These charts, like the Broselow tape, are made by people who are not stressed for use by people who might be stressed (like when a baby just popped out). They will help you determine what size ETT to put in and often have all sorts of other helpful information as well.

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