

# WINGS, WHEELS & ROTORS

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Air & Surface Transport Nurses Association



## Tubing Tiny Tots: Neonatal Intubation Q&A

Scott L. DeBoer, RN, MSN, CEN, CCRN, CFRN

### So, what's different about intubating a baby?

Equipment wise, adults are easy. Young or old, they all get a 7.5 or an 8.0 endotracheal tube (ETT). Babies ("TOT's" and "BOB's") and their respective airways come in various sizes; therefore, it's not quite that easy. So what, even if you are not the one who's going to put in the ETT, do you need to know?

**"The difference between men and women is that, if given the choice between saving the life of an infant or catching a fly ball, a woman will automatically choose to save the infant, without even considering if there's a man on base!"**

—Dave Barry

### What size ETT should be placed in a baby?

**Weight:** The Neonatal Resuscitation Program (NRP) shows that ETT sizes can be calculated based on the weight of the infant. This works well if you resuscitate infants every day and you have a scale immediately available or with decent accuracy can guess newborn weights (you should be working at an amusement park), otherwise there's got to be a better way.

**Formulas:**  $16 + \text{age} / 4$  – Oh, please. How does this work with a 24-week

preemie? If you are stressed & try to do  $16 + 24$  (weeks, not years) / 4 – this results in 10.0 ETT which is a bit big for most adults, not to mention a preemie.

**TOT's & BOB's:** Look at the baby. Remember there are really only three kind of babies, "TOT's", "BOB's," & ones that are between a "TOT" and a "BOB." If the baby looks like the tiniest baby you've ever seen, that is a "TOT" ("Tiny ol' thing"). If the baby is big and chubby, that's a BOB ("big ol' Buddha") "TOT's" get the tiniest tube you can commonly find, which should be a 2.5. "BOB's" get a 3.5 or even a 4.0 ETT. Babies who are "scrawny" between a "TOT" and a "BOB" get a tube between a 2.5 and a 3.5, i.e. a 3.0.  
<1 kg: 2.5 ETT  
1-2 kg: 3.0 ETT (Just remember, "between 1-2, then it's a 3.0")  
>2 kg: 3.5 ETT

**Dates:** If mom is pregnant & not only knows she's pregnant (amazing I realize), but also how far along she is (too much to ask for in many EMS systems or ER's), and you can put in a decimal point between the two numbers of the gestational age in weeks, you're set. Example: If mom has a full-term, 40-week gestation baby ("BOB"), a 4.0 ETT is appropriate. For a 25-week premature baby ("TOT"), a 2.5 ETT should be placed:

<28 weeks: 2.5 ETT  
28-34 weeks: 3.0 ETT  
>34 weeks: 3.5 ETT

**Charts:** Simply, get one. Either for your pocket or your Palm Pilot. These are made by people who are not stressed, therefore when you are stressed (i.e. the baby just popped out), look at the charts. They will tell you what size ETT to put in.

**"No fetus coming into the world before the seventh month of pregnancy can be saved."**

—Hippocrates 460 B.C.

**Divine intervention:** How small is too small? The envelope keeps getting pushed with smaller & smaller babies. For EMS/ER caregivers, review your system protocols, but my recommendation is simply this. If it looks like a baby and it acts like a baby, try to resuscitate it. If neo/peds are quickly available, please use them. In the interim, attempt resuscitation if it looks like a baby until those with more experience tell you otherwise. So what is "divine intervention?" A very wise/experienced neonatologist summarized this concept with the following statement: "Babies that are born too soon need to get 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 too small." The underlying problem when cyanosis or bradycardia

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in any newborn, no matter the size, is inadequate ventilation. Newborns respond well to ventilation, even with a bag/mask, until an ETT can be placed.

### Can/should we use a stylet?

Stylets, otherwise known as “intubation coat hangers,” can be very helpful (if properly inserted so the tip is not past the “Murphy’s Eye” near the end of the tube). I feel that you should at least consider putting a stylet in every ETT. If you need it, you’ve got it, and the tube goes in the first time. If you don’t need it, you are not going to do anything different, and the tube goes in the first time. However, if you need it, and the stylet is sitting on the counter, what do you have to do? Take the blade out, “bag the baby,” put the stylet in the ETT, and try to find the cords again. Why would you do that? As with many things, with experience, comes preferences, and some practitioners “swear by stylets,” while others do not recommend their routine use. If you have experience in intubating newborns and find them helpful, great. But at least consider their use as recommended by many neonatology and anesthesia professionals.

### What about cuffed vs. uncuffed tubes?

Babies’ airways are “tiny funnels.” They are big at the top, and small at the

bottom. The smallest part of a baby’s airway is the bottom of the funnel, or the cricoid ring. An appropriately sized uncuffed tube should “just slide on through.” Using an uncuffed tube allows for the maximum inner diameter (where the air goes in/out through) and potentially less tracheal necrosis. Cuffed ETT’s are used with adults because their airways are “big tubes,” (i.e. big at the top and big at the bottom). What happens if you put an ETT into an adult’s airway, forget to inflate the cuff, and then “bag” them? The air goes down and comes right back out again. Adult airways are like urinary bladders and Foley catheters. If you put a Foley catheter in and don’t inflate the balloon, what two things come out? The pee and the Foley. That’s why adults need cuffed tubes but infants, as a rule, should have uncuffed tubes.

### What about laryngoscope blades? Straight or curved?

In infants, as a rule, a straight blade should be used. All newborns, from “TOT’s to BOB’s” can be intubated using a zero blade. Babies have big tongues, a big floppy epiglottis, and seemingly no vallecula (the space right before the epiglottis where a curved blade should be placed in older patients). Therefore, use a straight blade, gently lift the tongue and epiglottis out of the way, and put the ETT in.

### Should we place the ETT down the mouth or the nose?

In the neonatal ICU environment, where they do this procedure every day, they can do either. In the crisis settings of the ambulance, ER, with non-NICU transport teams, we don’t intubate newborns everyday; therefore, go down the mouth. Why?

- 1) The mouth hole is bigger than the nose hole.
- 2) If you put the ETT down the mouth, you actually see where the ETT is going; therefore, the chances of placing it in the trachea are much better.
- 3) Remember that in the back of children’s throats are amazingly vascular structures called tonsils. If an ETT starts bouncing off these, they can bleed quite profusely.
- 4) Babies’ vocal cords are very anterior (toward the front of the neck). If you blindly put an ETT down a baby’s nose and hope that it will go where you want it to go (i.e. trachea), it just isn’t going to happen that easily.

So when you need a tube right here, right now, put it down the mouth. Also, during difficult intubations of newborns, remember that you may be asked to provide gentle external cricoid (front and middle of the neck) pressure to help lower the vocal cords into view.

### Securing the ETT:

Newborns have short tracheas so it is easy for the ETT to be placed in the right mainstem bronchus or end up at the carina, where the right and left bronchi split, causing the ETT to be occluded and interfering with ventilation. Every effort should be made to avoid either. ETT’s have numbers that run along the side of the tube. It’s another number rule to remember, but the NRP rule is to tape the ETT at “6 plus the weight in Kg.” A “TOT” or about a 1-kg infant, would be taped at 7 cm, 8 cm for a 2-kg infant, and 9 cm for a “BOB.” “1-2-3, 7-8-9.” Don’t forget to determine if breath sounds over each lung are equal and assess the infant for improvement in color and a stable heart rate.

## How long should an intubation attempt be?

In most cases, the baby will let you know when you have taken too long. NRP recommends a maximum of 20 seconds per attempt, but remember, numbers are good, kids are better. Therefore, closely monitor the heart rate and oxygen saturation (if in use), and with any significant decrease in heart rate (i.e. it drops below 100), abandon the intubation attempt. Ventilate the baby with 100% oxygen, and between attempts remember to close the handle/blade to prevent the laryngoscope blade from overheating and possibly burning the baby's mouth or airway. Intubation of the newborn can be challenging even to healthcare professionals working in neonatology. Newborns can respond well with bag/mask ventilation (covering both the nose and mouth) for prolonged periods, so intubation can be delayed if necessary until an ETT or infant LMA can successfully be placed.

This article is adapted from

Emergency *Newborn Care: The First Moments of Life*,  
ACM Publishing, [www.Peds-R-Us.com](http://www.Peds-R-Us.com)

**“A person is a person, no matter how small”**

**–Dr. Seuss**

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A complete list of references for this article is available upon e-mail request:  
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## CFRN Review Questions: Pediatric Transport

*Jill Johnson, RN, MSN, CCRN, CEN, CFRN*

1. **Autonomy versus doubt and shame is the developmental stage of which age group?**
  - a. Infant
  - b. Toddler
  - c. School age
  - d. Adolescence
2. **You have a pediatric patient with a fracture in which one bone is forced against another. You know this as what type of fracture?**
  - a. Compressed fracture
  - b. Compound fracture
  - c. Greenstick fracture
  - d. Displaced fracture
3. **In preparing to transport a pediatric patient with Osteogenesis imperfecta the transport team knows that which of the following is a major consideration during transport?**
  - a. Respiratory distress
  - b. Bruising tendencies
  - c. Fracture risk
  - d. Seizures
4. **The transport team knows that a large rounded soft tissue mass at the base of the tongue on a lateral film indicates which of the following?**
  - a. Foreign body aspiration
  - b. Retropharyngeal abscess
  - c. Epiglottitis
  - d. Croup

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# Vision Zero: The changing safety environment

Kate Moore, RN, NREMT-P, CCRN, CEN, ACNP

In October 1997, the Road Traffic Safety Bill founded on Vision Zero was passed by a large majority in the Swedish parliament. The Vision Zero concept is that eventually no one will be killed or seriously injured within the road transport system. Vision Zero as related to road traffic safety is an expression of the ethical imperative that it can never be ethically acceptable that people are killed or seriously injured when moving within the road transport system.

Vision Zero is also the name for the safety initiative created as a call-to-action by the air medical transport community, to the air medical transport community. As members of ASTNA, we are a part of that call-to-action; we are a part of the air medical transport community pledge of zero tolerance for incidents and accidents.

Our industry has grown exponentially in the last decade and as growth has occurred, the actual accident rate is unknown. What is known is that 2004 and 2005 have produced the highest number of fatal occurrences in the air medical community. We as a community must not tolerate these occurrences. We must work together to end these occurrences. Toward that end, AAMS announced Vision Zero in March 2005.

The goal of Vision Zero is zero errors of consequence in the air medical community. The job we do is characterized by many unknowns; safety should not be among the unknowns we face each day. Safety is the responsibility of every member of the air medical community. We must hold all colleagues to a commitment to Vision Zero and have zero tolerance for errors of consequence.

Just as Vision Zero was passed by the Swedish parliament as a philosophy of road safety that eventually no one will be killed or seriously injured within the road transport system; Vision Zero for the air medical transportation community is a philosophy of air medical transport safety that eventually no one will be killed or seri-

ously injured during the provision of air medical transportation. The public we serve places their very lives in our hands at their time of greatest need.

Vision Zero provides a vision of a safe air medical transport system which will be used to guide the selection of strategies and then setting of goals and targets for the implementation of the selected strategies. Vision Zero does not target a specific date for achievement. It is a paradigm shift from an emphasis on current problems facing our industry and possible ways of reducing them to being guided by what the optimum state of the air medical transportation industry should be.

The Swedish authors of Vision Zero proposed ethical rules to guide the system designers. Two of these are: "Life and health can never be exchanged for other benefits within the society"

"Whenever someone is killed or seriously injured, necessary steps must be taken to avoid a similar event".

These ethical principles can provide guidance to the air medical transport community as we implement our Vision Zero.

The most important part of the vision and the meaning of 'Vision Zero' as adopted by the Swedish parliament is that "no foreseeable accident should be more severe than the tolerance of the human in order not to receive an injury that causes long term health loss".

The Vision Zero initiative of the air medical transportation community is built on that same conceptual approach. The approach is based on a belief that while errors in a complex system are unavoidable, it is possible to alleviate the consequences of error. The Vision Zero project, a long term policy initiative adopted by the AAMS Board of Directors, is based on developing better understanding of human behavior. Vision Zero hypothesizes that it is possible to use a public health model combining research, engineering, education, and enforcement to arrive at a zero accident rate.

The AAMS Board of Directors believes at its core, Vision Zero is the "image of a desirable society." "It is a belief and cultural values system tied to active policy for implementation based on a premise that errors of consequence can be eliminated.

Vision Zero is our community's safety program to promote safety awareness with a program that would reach the community with timely information and educational opportunities".

The AAMS Board of Directors states: "All of us must commit to Zero Errors of Consequence with no fatal crashes or serious injuries. As a community, we must determine and agree on a timeframe in which this can be accomplished. There must be an agreed upon system of measurement and commitment to identifying and implementing best practices that will enable us all to reach this goal". In order to reach this goal, AAMS will implement the following initiatives:

- Incorporate "best practices" session(s) at the AMTC and the AAMS Spring Conference that highlight innovative and replicable safety programs.
- Sponsor 2nd Annual Safety Technological Conference featuring a broad scope of technologies available to enhance safety for air medical providers.
- Promote the Air Medical Resource Management (AMRM) program developed by Michelle North.
- Work to increase the number of weather reporting stations, especially in rural and mountainous areas where weather reporting is lacking.
- Continue to promote Safety Awareness with a variety of Vision Zero products.
- Safety sessions as pre-conference offerings and main session offerings for CCTMC in 2007 and AMTC in 2007.

## President's Column

### Dear ASTNA Member:

On behalf of all of the members of the Air & Surface Transport Nurses Association (ASTNA) Board of Directors and our general membership, I want to encourage you to renew your membership with ASTNA, the organization that represents all transport nurses; ground, rotor, and fixed-wing. As you have seen this past year, ASTNA is committed to giving our members a collective voice within our industry. We encourage you to participate fully in the activities of the Association in order to make the best use of your membership.



Denise Treadwell, CRNP, MSN, CEN, CFRN

**“Advance the practice of transport nursing and enhance the quality of patient care”.**

Committed to our mission, “Advance the practice of transport nursing and enhance the quality of patient care”, we are continuously working to define and promote the transport nursing profession through educational opportunities, reviewing and revising our position statements to reflect current practice, and defining the practice standards of each mode of transport involved in our profession, such as the Standards for Critical Care and Specialty Ground transports which will be revised this year. To best represent all the Association’s members, a number of committees assist the Board of Directors with their work. Some of these are standing committees, such as the Membership Committee, Education Committee, Safety Committee, Military Committee, and the Research Committee. Other resource groups are assembled to provide the Board a link to various specialties or subject matter experts, who advise the

Board on matters related to Fixed Wing, Neonatal and Perinatal, Maternal/HROB, Ground Transport, and the Pediatrics. As an ASTNA member, your participation with the activities of these groups is greatly appreciated. We also welcome your contributions our quarterly newsletter, Wing, Wheels, and Rotors.

We also encourage ASTNA members to attend the educational offerings and take advantage of the networking opportunities with fellow colleagues at the major industry conferences this year. The Critical Care Transport Medicine will be held April 2 - 4 in San Antonio, Texas and the Air Medical Transport Medicine Conference will be held September 17 - 19 in Tampa, Florida. In addition, numerous Transport Nurse Advanced Trauma Courses will be offered throughout the year. We invite you to visit our website at [www.ASTNA.org](http://www.ASTNA.org) to find out about upcoming courses or to see how you can get involved with any of our committees, resource groups, or by participating in special projects.

If you have any questions about your membership, or how you can become involved, please contact me at [dtreadwell@airmed.com](mailto:dtreadwell@airmed.com), or the National office at [astna@gwami.com](mailto:astna@gwami.com). We value your opinion and your suggestions.

Sincerely,

A handwritten signature in blue ink that reads "Denise Treadwell".

Denise Treadwell, CRNP, MSN, CEN, CFRN  
ASTNA President 2006 - 2007

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## ASTNA New Board Members



**Major Christopher Paige**  
USAF, NC

In 1993, shortly after graduating from Western Connecticut State University School of Nursing, I entered the United States Air Force as a Second Lieutenant. I had five years of experiences as a certified cardiology technician. My passion has always been both cardiology and emergency nursing. It was a very short time after arriving at my second duty assignment (from Virginia to South Carolina) that I was completing my Emergency Medical Technician – Paramedic training. I was required to move unstable patients from our small medical facility to larger hospitals one hour away. By 1996 I was moving to Colorado (my third assignment). During that time I was able to attend the Air Force Flight Nursing course in San Antonio Texas. By 2000 I had become certified in flight nursing, emergency nursing and achieved national registry as a paramedic. I also finished my MSN, Family Nurse Practitioner, at the University of Colorado at Colorado Springs. By July 2000 I was on my way to the White House Medical Unit. Directly supporting Presidents Clinton and Bush, their families and staff required a transport nursing perspective. In this position I traveled to 24 countries and nearly every state, interacting with trauma centers and transport services around the world. Since July of 2004 I have been assigned to the 86th Aeromedical Evacuation Squadron at Ramstein Air Base,

Germany. The mission is to transport the War on Terrorism casualties. Weekly we go into Afghanistan and/or Iraq. We stabilize the patients in Germany at the Landstuhl Regional Medical Center then fly those unable to return to their units on to Washington, DC. There they are treated or sent on to their home bases. As a new member of the ASTNA Board, I hope to increase military membership to ASTNA and identify safer ways to transport our heroes in the War on Terror.



**Michael A. Frakes**  
APRN, MS, CCNS, CFRN, CCRN, EMTP

I am in my 9th year as a flight nurse, my 19th year of transport, and my 3rd month as a Director-at-Large on the ASTNA Board. I work as the Clinical Practice Coordinator for LIFE STAR in Hartford, CT and as a Critical Care Transport Nurse for Boston MedFlight. I have nursing experience in the adult and pediatric ED and adult in pediatric critical care, and worked as a ground paramedic and air medical communications specialist before becoming a nurse.

On the ASTNA Board, my job is to represent all of the members of the Association in an open and responsive way that is good for the members and good for the profession. I am completing a term on the TNATC Advisory Committee, and will be the ASTNA liaison to the Southeast Region and the AAMS Research Committee.

I look forward to working for you and hope that you will contact me if I can be helpful in your interaction with ASTNA.



**Cathy Spry**  
RN, BSN, CFRN, CEN

I would like to introduce myself to the ASTNA membership. I have been involved in transport nursing since 1993 with STATCARE, Louisville, Kentucky. My program has been through a merger and most recently purchased by our vendor. Our industry is continuously changing. If any of my experiences in these transitions can be of assistance to you, please contact me. On a personal note, my home is in Hanover, Indiana. My son attends Indiana State University majoring in Aviation. I am the designer of the Air Medical Memorial Wings whose monies are recycled into our industry through the ASTNA Bereavement Fund, FARE, and other Safety Research. Thank you for this opportunity to serve you as a Director at Large on the ASTNA Board of Directors.



# What Does the Baby Weigh?

## Challenges in Transporting the ELBW Infant

*S. Louise Bowen, RNC, CMTE, CNA, BC, MSN, ARNP*

**T**ransporting an extremely low birth weight (ELBW) infant is one of the most challenging transports a team encounters. Those challenges can range from oxygenating and ventilating to maintaining skin integrity, preventing hypothermia, and hypotension.

More than 500,000 babies are born prematurely every year in the United States. Prematurity has increased by 29% since 1981 and accounts for 12% of

**More than 500,000 babies are born prematurely every year in the United States. Prematurity has increased by 29% since 1981 and accounts for 12% of all live births.**

all live births. About 1% of the babies are ELBW. The ELBW infant is defined as a baby that weighs less than 1000 grams.

Over the past decade, advances in neonatology and technology have led to increased survival rates of ELBW infants. The availability of assisted reproductive technologies has also increased the incidence of multiple gestations born prematurely. These advances have led to increased survival rates of premature infants born at lower gestational ages.

Increased survival rates of ELBW infants have presented new challenges and problems to health care professionals. Long term neurodevelopment difficulties and increased incidence of chronic and acute illnesses have been reported. Infants born at 23 weeks gestation have an 80% mortality rate and those who survive have varying degree of neurological sequelae.

Maternal transport provides the optimum mode of transport to a high-risk center. Maternal transports result in improved short-term outcomes if the ELBW infant is delivered at a high-risk center. Maternal transports, however, are not always an option depending on conditions that impact the mother and /or the fetus.

### Respiratory Care

ELBW infants have an immature pulmonary structure, which makes them at risk for respiratory complications. The goals for oxygenation and respiratory support are to administer the lowest level of ventilator support possible that provides adequate oxygenation and ventilation and decreases the risk of barotrauma, volutrauma, and oxygen toxicity.

Infants less than 28 weeks have some degree of surfactant deficiency, which causes atelectasis, reduced ventilatory compliance, and intrapulmonary shunting. Studies have shown that the earlier surfactant is

administered the lower the risk of mortality and pulmonary complications. The Transport Team, however, may not always be present at the delivery. Surfactant may be administered by staff at the referring hospital depending of the type of facility and level of expertise. Consultative phone management by the neonatal center on ventilator settings may be given prior to the team's arrival.

The goal of ventilator management is to avoid overdistention of the lungs, hypoxia/hyperoxia, hyperventilation, and hypocarbia. All ELBW babies should be placed on pulse oximetry and end tidal carbon dioxide monitoring starting in the immediate resuscitation period and continued during the transport. Rapid changes or prolonged hypocarbia or hypercarbia can alter cerebral blood flow and increase the risk of intraventricular hemorrhage and periventricular leukomalacia. Oxygen administration during resuscitation in the ELBW infant is a controversial topic. Studies have examined the use of room air through 100% oxygen during resuscitation. The facility's protocol should be followed regarding the use of oxygen during resuscitation. The important concepts are that

all babies from the initiation of the resuscitation have an oximeter in place and the oxygen should be weaned as rapidly as possible.

### Temperature Regulation

The ELBW infant is at risk for hypothermia due to their large surface area, immature epidermal barrier, large surface area to weight ratio, and thin gelantous skin. These babies usually require frequent handling during the initial interventions performed at delivery and stabilization for transport, which increases the risk of hypothermia. Core temperature can decrease by two to three degrees Celsius in the first 30 minutes after birth. A combination of strategies can be used to reduce and or prevent hypothermia with some measures more effective than others. The transport incubator, blankets, and equipment (stethoscope) should be prewarmed prior to coming in contact with the infant. Skin surface exposure can be minimized with flexion and containment of the extremities. Chemical heat packs and transwarmer mattresses are effective in reducing hypothermia, but should never be placed directly on the skin. Polyethylene occlusive skin wrap or bags are also very effective in minimizing hypothermia. Stockinette hats, however, were not found to be effective in reducing hypothermia in the ELBW infant. The external environmental temperature should be controlled and drafts should be avoided. Protective touch and minimal handling should be used. The incubator should be double walled and port holes should be kept closed as much as possible. An approved incubator cover can also be used.

### Fluid Management

Establishing vascular access is challenging in these babies. Options for establishing vascular access include using peripheral intravenous or umbilical venous lines. Peripheral intravenous inser-



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tions can be extremely difficult and can increase risk for hypothermia, infection, bruising, and loss of skin integrity. In determining the type and number of vascular access needed for transport the condition of the infant, transport mode and distance, type of fluid and medications that need to be administered, and blood sampling requirements need to be considered in consultation with transport medical physician control. The team will need to perform the necessary steps to transport the infant safely and provide the necessary treatments.

Transepidermal water loss is much higher in the ELBW infant compared to the more mature infant. The ELBW infant may lose up to 150 to 300 ml/kg/d of free water through the skin during the first three to five days. This makes it difficult to maintain their water balance unless these excessive losses are prevented. Maternal condition, medications, and fluid administration to the mother during labor and deliver may also affect the fluid and electrolyte balance in the newborn. The goals are to correct or prevent hypoglycemia, hypotension, and hypovolemia. The rate of IV infusion may vary from 100 to 200 ml/kg/day depending on weight, amount of insensible water loss, and electrolytes. Prevention of hypoglycemia usually requires a glucose infusion rate of 4 to 6 mg/kg/min. The glucose infusion rate is influenced by the IV rate and the glucose concentration. Since ELBW infants generally require increased IV rates D5W is used. All fluids administered to the infant should be counted in the daily totals, including maintenance IV fluids, medication drips, flushes, and arterial line fluids. Hypo-

glycemia is defined as blood glucose less than 40 dl/ml. Generally, D5W is used for infants under 900 grams and D10W is appropriate for infants 900 grams and above. Concentrations less than D5W are not recommended because of their isotonicity.

Hyperglycemia is a potential problem in the

ELBW infant, which can lead to dehydration and electrolyte imbalances. Hyperglycemia is defined as a blood glucose greater than 150 dl/ml. Regular insulin drip may be considered for glucoses greater than 200 dl/ml.

### **Cardiovascular**

Obtaining blood pressures in the ELBW infant can be challenging. Blood pressure cuffs are very invasive and can cause skin damage in these patients. The team should monitor the set limit on how high the blood pressure machine pumps even when in the neonatal mode. The blood pressure cuff should be rotated during the transport to decrease the incidence of tissue damage. If an umbilical arterial catheter is present it should be the source of blood pressure measurement. There are no published standards for defining blood pressures in the ELBW infant. If the baby is well oxygenated with low oxygen requirements and with good perfusion the use of mean blood pressure equal to gestation age can be used. Hypotension is defined as a mean blood pressure that is less than gestational age. Blood pressure alone, however, should not define hypotension or determine management. Skin perfusion, peripheral pulses, urine output, and blood gases should be considered. The mean blood pressure should increase during the first hour of life. Failure to increase the mean arterial blood pressure in the first three to six hours of life is associated with increased mortality.

### **Skin Management**

The ELBW infant has thin, gelantous skin, which makes them prone to tears, abrasions, and bruising. Application of a polyurethane barrier surface to the skin to attach external monitoring devices will not only protect the skin but also decrease insensible water loss. When using barriers, the thoracic cavity should not be wrapped too tight to cause constriction or compromise pulmonary function. If the barrier is cut into strips, the barrier edges that are placed on the chest and back should not meet. Alcohol or adhesive bonding agents should be used. Antiseptics should be completely cleaned from the skin after a procedure is completed. It is important to check the infant's back for antiseptic solution. Pulse oximeter probes should not be wrapped too tight and minimal adhesive on the skin should be used. On long distance transports, the skin should be checked under the probe and the probe may need repositioning to another location.

**Obtaining blood pressures in the ELBW infant can be challenging. Blood pressure cuffs are very invasive and can cause skin damage in these patients.**

### **Pain Management**

The transport environment has increased lights, noise, and vibration. The ELBW infant may exhibit maladaptive response to the transport environment with changes in physiologic, behavioral and state functions. A pain scale should be used during the transport as an indicator of how the infant is adapting. Nonpharmacologic interventions can be employed to eliminate or minimize maladaptive responses. The infant should be positioned with a symmetrical posture in a flexed position with boundaries and containment with a rounded head that allows for active head rotation. Hand-to-mouth activity should be facilitated. Minimal handling should be used but when required

*Continued on page 10*

handle the infant gently and move slowly. Talk in soft gentle tones around the infant. Cluster care to minimize hands-on touch. Decrease external stimuli by lowering ambient light, protect the eyes from light, and use a special incubator mattress that reduces vibration. Opioid analgesics can be used for pain management in conjunction with nonpharmacologic interventions.

### Conclusion

Transport of the ELBW infant is challenging. As technology improves there will be increasing numbers of ELBW infants born at increasing smaller gestational ages. As transport staff, it is crucial that we keep current on new strategies and products available for the ELBW infant.

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## Pediatric Transport Answers

*Jill Johnson, RN, MSN, CCRN, CEN, CFRN*

1. **B.** The developmental stage for Toddlers is autonomy versus doubt and shame. Infant is trust versus mistrust. School-age is Industry versus inferiority. For adolescence it is identity versus role confusion. (Clark, 2006, 543-545)
2. **A.** Compressed fractures occur when one bone is forced against another. The periosteum divided on only one side is known as a Greenstick fracture. Compound fracture is where the bone broken and piercing the skin. A Displaced fracture is where the bone is not aligned. (Holleran, 2003, p. 07)
3. **B.** Osteogenesis imperfecta (OI) is a genetic disorder where bones break easily for no apparent reason. Use extreme caution when moving children with OI, never pick them up under their arm. (Clark, 2006, p. 589)
4. **D.** In Epiglottitis a lateral neck film will show a large rounded soft tissue mass at the base of the tongue also know as the "thumbprint sign". An anteroposterior neck radiographic showing a funnel shaped subglottic narrowing also known as the "steeple sign" is diagnostic for croup. A retropharyngeal abscess typical shows a widening of the retropharyngeal space. A foreign body aspiration may have a normal x-ray or show atelectasis, infiltrate, or hyperinflation and asymmetric aeration may be seen. (Clark, 2006, p. 557-561)

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# Subject Matter Advisors

We are pleased to announce the introduction of the ASTNA Subject Matter Advisors (SMA).

The Subject Matter Advisor differs from other committees in that the SMA may be called upon to assist with a single limited project, or a more complex ongoing one. This affords the SMA the ability to participate on a variety of levels within the association.

The SMA will ideally be an experienced transport nurse who has a demonstrated proficiency in a "Focused Area of Expertise" that will serve as a volunteer to the Board of Directors. For example, the SMA could be tasked with authoring papers and/or articles for the association newsletter, Wings, Wheels and Rotors, working collaboratively with other members on research topics specific to a Focus Area of Expertise, serve as a resource to the Board of Directors and/or staff to monitor a particular issue within their Focus Area of Expertise, and to author or review Association position statements, documents or proposals.

## Focus Areas of Expertise include

To qualify as a Subject Matter Advisor, you must meet three of the following criteria:

1. Three years experience as a transport nurse and currently actively involved in transport nursing.
2. Demonstrated knowledge/expertise in a Focus Area of Expertise.
3. Currently in transport nursing practice with an awareness of emerging trends in the profession.
4. Skilled in critical thinking and analysis.
5. Participation on committees or Special Interest Groups (SIG's) (locally or nationally) on the Focus Area of Expertise, or a closely related topic.
6. Specialized certification i.e. CFRN, CTRN, CCRN, CEN.

If you feel that you meet the requirements and are looking to challenge yourself, please contact ASTNA to request the Subject Matter Advisor application packet.

Contact ASTNA at 720-488-0492 or [astna@gwami.com](mailto:astna@gwami.com) or write to:

ASTNA  
Suite 100  
7995 E. Prentice Avenue,  
Greenwood Village, CO 80111

ASTNA is always looking for people who want to get involved, and this is a great way to start.

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## • • • • • **Calendar** • • • • •

- **April 1, 2007** – Sign up now for the CFRN/CTRN review course to be held prior to the CCTMC conference. You can also sign up for the CEN, CFRN and CTRN exams on April 2, 2007. Space is limited so act now! Review course registration forms are located on the ASTNA website.
- **April 2-4, 2007** – The Critical Care Transport Medicine Conference is just around the corner! Register now for this unique and informative conference in San Antonio, TX on More information including a brochure and registration forms are located at [www.astna.org](http://www.astna.org).
- **Announcing-New Online CE Article!**  
Earn 1.5 CE by reading the online article, *“Identification and Management of Ductal Dependiant Cardiac Defects in the Transport Setting”*  
by Robyn Neely Funk, RN, BS/BSN, PHRN, CMTE and taking a test to earn your CE. The cost is \$10.00 for members/\$15.00 for non-members. Visit our website for a more information!
- **The TNATC Provider and Advanced Provider Manuals are now available for purchase only through ASTNA.**  
The Transport Nurse Advanced Trauma Course Provider manual includes operational and clinical components for managing the trauma patient. Operational considerations include transport safety and physiology as well as stress/critical incident management and legal considerations. Initial and ongoing care of the trauma patient including assessments and interventions is covered by systems with a balanced discussion of current management strategies. Special considerations in trauma care such as delayed trauma transport, trauma in pregnant and pediatric patients as well as burn trauma are reviewed. The appendices are full of additional

information related to airway and ventilatory management, invasive procedures, radiology interpretation, and long distance transport. This book is a must reference for any provider who transports trauma patients. Visit, the ASTNA website, [www.astna.org](http://www.astna.org), to order the manuals (334 pages) online.

**Cost:**

\$75.00 ASTNA members

\$120.00 Non-members

The Advanced Provider manual is a supplement to the TNATC provider manual and will be of interest to those transport providers who are looking for additional information related to assessment, care, and management of trauma patients. Topics such as geriatric trauma and multiple casualty management are included as well as a chapter on interpretation of cranial CT scans. This book also includes several difficult airway scenarios requiring advanced critical thinking and assessment skills. (65 pages)

**Cost:**

\$50.00 ASTNA members

\$80.00 Non-members

- **September 17-19, 2007** – Air Medical Transport Conference (AMTC)  
Tampa, Florida, For more information please visit, [www.aams.org](http://www.aams.org)
- **February 18, 2007** – Please help us support Critical Care Transport Nurses day. You should have received your poster for display. If you would like more, please contact the National Office for extra posters.

**Thank you for your continued support of ASTNA!**



## TNATC upcoming classes:

Advanced Provider Course in Stanford, CA  
**April 12, 2007**

Provider Course in Salt Lake City, UT  
**April 13-15, 2007**

Provider course in Des Moines, IA  
**April 13-15, 2007**

Provider course in Kansas City, MO  
**May 7-9, 2007**

Provider course in Stanford, CA  
**May 16-18, 2007**

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## Provider Course

### Is your TNATC provider status going to expire?

TNATC providers who wish to re-verify may do so by taking the Advanced Provider (AP) course. This fast-paced, one-day course is geared toward those advanced transport practitioners who wish to obtain additional information and skills. The student who re-verifies as an 'advanced provider' is expected to be comfortable and competent with the knowledge and skills presented in TNATC provider curriculum. Transport practitioners with less experience and exposure to trauma care and practice are encouraged to retake the 3 day provider course for reverification.

The Advanced Provider (AP) course includes an update lecture and case studies on geriatric trauma, delayed trauma transport, and disaster/mass casualty incidents. Skills stations include advanced airway management scenarios, cranial CT interpretation, and invasive skills. Written and practical exams covering basic and advanced

provider content must also be completed successfully in order to achieve re-verification as a TNATC 'advanced provider.'

Below are a few comments from students who have taken the course

**"Enjoyed the class very much, useful info and well presented."**

**"Hands on practice with advanced skills"**

**"Enthusiastic instructors, comfortable environment, additional advanced info."**



Kate Moore

## New Editor

**Kate Moore, RN, NREMT-P, CCRN, CEN, ACNP**

As you may have noticed with this issue, there is a new member of the editorial staff. I would like to take a moment of your time to introduce myself, Kate Moore, as a new editor of WWR. I will be working closely with Steve and Pam as I transition into this position. We are fortunate that Steve will continue to work with us in the capacity of Editorial Coordinator for WWR. I look forward to working with each of you as I integrate into the role of editor. I am employed by Air Evac Lifeteam as the Clinical Research Coordinator and am primarily engaged in clinical research with additional duties in education and training program development. Living in Nashville, TN, I travel a great deal with Air Evac and hope to get to know more about all your programs. Being both a Registered Nurse and National Registry EMT-P, I have experience in both pre-hospital and in-patient critical care and emergency medicine. I am certified as an Acute Care Nurse Practitioner and will complete the requirements for the Doctor of Nursing Practice degree from Case Western Reserve University in May. I am also a Lieutenant Colonel in the US Army Reserve, Army Nurse Corps and just returned last month from a 13 month deployment in Iraq. I was with the 10th Combat Support Hospital in Baghdad. Please let me know how I can best be of service to you as I assume this new role as WWR editor.



Pam Peterson

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The editors for Wings, Wheels & Rotors  
are looking for talented writers for upcoming issues.

Please contact us with your ideas!

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