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Dr. Ira Landsman with a playful patient.

## Let's Be Blunt.....We Still May Need Sharps

*Anesthesiologists should understand government mandates affecting care*

**By Ira Landsman, MD**  
*Vanderbilt Children's Hospital*

How many times has this happened to you or a colleague? You are beginning a complex anesthetic for a patient requiring several intravenous catheters and an arterial line. The child has a history of difficult vascular access. So you reach for your favorite intravascular catheters and find that the administration has substituted safety catheters with strange buttons and levers. You have no idea how to use them. You "politely" ask the anesthesia technicians and nurses, "Why wasn't I informed of this change?". The answer that raises your already high blood pressure is, "Because OSHA made us do it". So after "blowing" several veins with these new catheters, your savvy anesthesia technician slips you some contraband cath-

eters that are being stockpiled for the anesthesia group just for this scenario.

The State of Tennessee and the other states, together with OSHA (Occupational Safety and Health Administration), are serious about hospitals reducing the incidence of needle stick injuries in the work place. It is a noble cause, but we all realize that substitute products are not practical for all patients, especially when it comes to arterial line placement. The State and Federal regulations allow physicians and nurses to make a decision about a safety product's utility. Physicians and nurses are mandated by state and federal governing bodies to trial safer products; however there is a process that hospital administrators must follow that afford health care workers the opportunity to trial and, if necessary, establish exceptions for safety product. Before a new

# The Banner of Safety

By Allison Kinder Ross, MD  
*Duke University Medical Center*

This edition of the SPA Newsletter includes a potpourri of articles, but highlights Dr. Landsman's piece on the use of safety catheters. In a very unofficial poll at the SPA meeting in San Diego, I asked a number of pediatric anesthesiologists what the practice was at their own institution. Unanimously, the use of safety catheters has taken over with the vast majority finally succumbing to their use for all procedures.

We are certainly creatures of habit, or more accurately, persons of routine. To steer from the known to the unknown in the care of pediatric patients will always take us out of our comfort levels and cause us to start making noise under the banner of safety.

In my administrative role, I often see the catch term of "safety" being overused. We must truly look at what is best for our patients, our colleagues, or our staff before claiming that an issue is a matter of safety. Sometimes safety is confused with personal preference or convenience, and when presented under the guise of safety, the true purpose will often be transparent and we lose credibility.

## KEEPING UP WITH KIDS

# Who is Hannah Montana, and what is it like going to her concert?

By Tae Kim, MD  
*Texas Children's Hospital*  
*Father of 11 year-old Hannah Montana fan*

Hannah Montana (aka Miley Cyrus) is the daughter of country music star Billy Ray Cyrus. Hannah has developed into a Disney phenom. To be present at one of her concerts, in simple terms, it was a madhouse. The sold-out concert held on March 9, 2008 represented the fourth concert held in Houston, Texas in the past 18 months. The large fan base representing mostly girls from 5-12 years of age was dressed in pink outfits and platinum blond wigs to see their favorite performer. Parents were equally excited to see the performance and relive their own experiences as concert goers. The repertoire of songs included: "Rock Star", "Nobody's Perfect", "Life's What You Make It", "Best of Both Worlds" and "See You Again".

At various times throughout the concert, the audience was encouraged by the star to sing along to such songs as "Nobody's Perfect" and show their enthusiasm by being "louder," which resulted in deafening high-pitched screaming. During the concert Miley Cyrus and her father sang "Ready, Set, Don't Go" together for a memorable finale. The concert lasted 75 minutes and everyone left with a huge smile and a hoarse voice.

Dr. Landsman describes the process of how to take a true safety issue and present it in an organized fashion to hospital administration with the use of guidelines. In order to claim safety and the ultimate effect of a change of practice, data in such circumstances must be able to be collected and analyzed. These steps are imperative in determining the overall impact. Without follow-up, it is difficult to truly determine whether an action has resulted in a safer practice.

This issue, however, is not just about safety. Particularly, I hope everyone enjoys the reviews of the excellent SPA meeting that was held in San Diego. There are also other pieces in this Newsletter that are very noteworthy and I welcome feedback at any time. In fact, I was very surprised that I received no communication regarding the Pro/Con on cardiac anesthesiology practice for noncardiac procedures presented in our last Newsletter. I would have thought that it would stir some attention.

Contact me at [allison.ross@duke.edu](mailto:allison.ross@duke.edu). I look forward to hearing from the members of this society, and thanks again to the many contributors of this edition.



### HANDS ON AT PEDIATRIC ANESTHESIOLOGY 2008

Attendees get hands-on practice during a peripheral nerve block workshop at SPA's Pediatric Anesthesiology meeting in San Diego in April. The four-day meeting drew 679 attendees from all over the world. You can read reviews of the sessions beginning on page 5. Next year's event is scheduled for March 19 - 22, 2009 in Jacksonville, FL.

## PRESIDENT'S MESSAGE

The past few months have been significant for the Society. Our application to the American Board of Anesthesiology (ABA) for subspecialty certification in Advanced Pediatric Anesthesia has engendered a vigorous conversation. Some anesthesiologists are concerned that certification will put an undue burden on general anesthesia practices by creating a demand for children to receive anesthesia care only by "certified" pediatric anesthesiologists.

However, the experience from other specialties indicates otherwise. For instance, subspecialization in pediatrics enhanced the depth of knowledge and expanded the scope of research and training. This is likely to improve the overall care for children, as the general pediatricians and their patients benefitted from the advances in the specialty.

Randy Clark's report in the A.S.A. Newsletter, May 2008 cogently presents the concerns while indicating the benefits of subspecialty certification in Pediatric Anesthesiology. The Society will continue to work with our sister organizations to clarify any misconceptions and concerns, as well as work with our colleagues to reach the important milestone of subspecialty certification in Advanced Pediatric Anesthesia.

On different note, I would like to thank Dr. Randy Flick for his leadership and hard work as program director for the Spring Meet-

ings in 2007 and 2008. Both meetings were extremely successful, educational conferences.

Also, please join me in welcoming Dr. Linda Mason as the program director for the 2009-2010 Spring Meetings. And, Drs. Mary Ellen McCann and Julie Niezgoda have agreed to serve as assistant program directors.

Finally, congratulations to two of our board members, Zeev Kain and Joe Tobin (president-elect for SPA). Zeev was recently appointed as chair for the Department of Anesthesiology at the University of California-Irvine and Joe Tobin has been named department chair at Wake Forest University. I wish them both the best in their new endeavors.

Thank you for the good work we have done for the Society and hope all of you have a wonderful summer!



**Jayant Deshpande, MD**  
Vanderbilt Children's Hospital,  
Nashville, TN



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## Sharps, from page 1

product becomes fait accompli, the new product's users should be invited to an in-service, given an opportunity to formally evaluate the product and participate in a dialogue among all stake holders as to the product's utility. The State of Tennessee (as do many states) defers to OSHA standards on the issue of non-safety catheters in the operating room.

TOSHA (Tennessee **O**ccupational **S**afety & **H**ealth **A**dministration) outlines the responsibility of the hospital to its employees and patients. TOSHA and OSHA allow for safety device exceptions based on evidence obtained by supervised trials together with a plan to insure safety while using non-safety devices. TOSHA's process for trialing products and establishing exceptions can be found at <http://www.state.tn.us/sos/rules/0800/0800-01/0800-01-10.pdf> and is summarized below.

(1) Available engineered sharps injury protection devices shall be evaluated and used when they are more effective in preventing exposure incidents.

(2) The engineered sharps injury protection device is not required if:

(a) A licensed healthcare professional directly involved in a patient's care determines, in the exercise of clinical judgement, that use of the engineering control will jeopardize the patient's safety or the success of a medical, dental or nursing procedure involving the patient. The determination shall be documented.

(b) The employer can demonstrate by objective means that it is not more effective in preventing exposure incidents than the alternative used by the employer. The determination shall be documented.

OSHA also advocates for a reasonable testing period with appropriate feedback from stake holders prior to hospital wide distribution of safer medical devices. The entire document may be found at <http://www1.va.gov/vasafety/page.cfm?pg=118>. Some relevant excerpts include:

- The term "**Engineering Controls**" includes all control measures that isolate or remove a hazard from the workplace, encompassing not only sharps with engineered sharps injury protections and needleless systems but also other medical devices designed to reduce the risk of percutaneous exposure to bloodborne pathogens.
- An "**appropriate**" safer medical device includes only devices whose use, based on reasonable judgment in individual cases, will not jeopardize patient or employee safety or be medically contraindicated.
- An "**effective**" safer medical device is a device that, based on reasonable judgment, will make an exposure incident involving a contaminated sharp less likely to occur in the application in which it is used.

- **Methods for soliciting employee input** may include involvement in informal problem-solving groups; participation in safety audits, worksite inspections, or exposure incident investigations; participation in analysis of exposure incident data or in job or process hazard analysis; participation in the evaluation of devices through pilot testing; and involvement in a safety and health committee properly constituted and operated in conformance with the National Labor Relations Act.
- When soliciting input from employees - seek input from non-managerial **employees** responsible for direct patient care who are potentially exposed to injuries from contaminated sharps. Employees involved in administering treatment or performing any procedure in the presence of an individual receiving care are considered to be involved in direct patient care.

“  
*Before a new product becomes fait accompli, the new product's users should be invited to an in-service, given an opportunity to formally evaluate the product and participate in a dialogue among all stake holders as to the product's utility.*  
”

At Vanderbilt Children's Hospital we have received waivers for the use of non-safety catheters for arterial catheterization especially in premature infants, neonates and toddlers. We have agreed to keep these non-safety catheters outside of the operating rooms in a red box clearly marked as containing non-safety catheters. To date, there are no reports of physician or nursing injuries using this method. Our exemption has been renewed for

another year.

OSHA maintains a site of frequently asked questions by physicians, nurses and hospital administrators as to the interpretation of the regulations that govern the use of safer medical devices. This FAQ site may be found at: [http://www.osha.gov/pls/oshaweb/owalink.query\\_links?src\\_doc\\_type=INTERPRETATIONS&src\\_unique\\_file=I20010517&src\\_anchor\\_name=1910.1030\(d\)\(2\)](http://www.osha.gov/pls/oshaweb/owalink.query_links?src_doc_type=INTERPRETATIONS&src_unique_file=I20010517&src_anchor_name=1910.1030(d)(2))

Safety in the workplace should be a high priority for all health care providers. In a perfect world all catheters would provide safety with maximum utility. Unfortunately, we do not live in a perfect world. The regulations are misinterpreted by well meaning administrators without giving the devices due process. We in turn feel we are at the mercy of governing agencies who do not understand the real world in which we must practice anesthesia. Anesthesiologists must understand state and federal mandates that affect our ability to care for patients by taking the time to read and understand these regulations. The regulations for non-safety devices clearly allow for exceptions based on objective data obtained by organized trials. I hope these recommended web sites will help you if and when your non-safety catheters suddenly become removed from your arsenal because you are told that "the government says so".

# Review of sessions at Pediatric Anesthesiology 2008

Friday, April 4, 2008

## FRIDAY MORNING REVIEW

Submitted by Dr. Helen V. Lauro  
SUNY-Downstate Medical Center



Dr. Lauro

Dr. Jayant K. Deshpande (Vanderbilt Children's) welcomed 679 meeting registrants, to the largest SPA turnout recorded since 1995, extending congratulations to Dr. Randall P. Flick (Mayo Clinic) winter meeting program chair and noting over-subscriptions to the second CCAS meeting, PALS and MHAUS sessions. Dr. Joseph P. Cravero (Dartmouth Hitchcock), Chairman of the AAP Section on Anesthesiology and Pain Medicine, reinforced to SPA/AAP meeting registrants the pivotal role of the AAP section on Anesthesiology as liaison between community of pediatric anesthesia providers and the behemoth organization of the AAP, and encouraged dual membership.

Dr. Lisa Wise-Faberowski (Denver Children's Hospital) moderated an outstanding first morning session *The Anesthetic Environment: First Do No Harm*, Dr. Vesna Jetovic-Tedorovic (University of Virginia) presented the experimental basis in *Anesthetics and the Developing Brain I*. Synaptogenesis, (synapse formation, glial cell proliferation, migration, maturation and differentiation) is responsible for tripling of brain weight. Rat studies confirm GABA A agonists and NMDA antagonists administered at peak of synaptogenesis (postnatal 7-10 days) cause apoptotic neurodegeneration in developing brain in anterior thalamus and cingulate cortex. Long term behavioral impairments have been implicated – experimental animals take twice as long to complete the Morris Water Maze compared to controls with difficulties in complicated tasks even on retesting at 30 days. This theoretically translates to children under age 2, with developmental behavioral sequela within 6 months post anesthesia. She concluded that the duration of synaptogenesis doesn't correlate with susceptibility to anesthetic induced neurological damage, and that maintenance of homeostasis during general anesthesia doesn't prevent permanent neuronal damage, however further clinical studies are needed. Dr. Sulpicio G. Soriano III (Boston Children's Hospital) spoke on *Anesthetics and the Developing Brain II*. He contended that methodological issues such as lack of consensus on duration of time exposure to anesthetic drugs (continuous dosing, prolonged exposure), lack of physiological monitoring and interspecies variation (dose response, drug metabolism, peak susceptibility) should deter us from extrapolating rodent data to neonates; additionally confounding variables such as genetic syndromes may be involved. He advised no real randomized controlled trials exist to evaluate cause-and-effect of general anesthesia; one major study in progress is the GAS study, a multi center randomized controlled trial evaluating neurodevelopmental assessment of 2-5 year old children undergoing inguinal hernia repair under general versus spinal anesthesia. Dr. Flick questioned the ideal endpoint of such human trials – learning disability or neurodevelopmental outcomes, Dr Soriano sug-

gested one possibility as “executive function” – can young adults function or are certain tasks not possible, however theoretically an endpoint might evolve with time. The consensus – pediatric anesthesiologists should not hesitate to administer general anesthesia for life-saving procedures until further evidence exists.

The first speaker in the second morning session *Unconventional Wisdom* was Dr. John B. Downs (University of Florida), on *Oxygen: Friend or Foe*. In the backdrop of common fallacies on oxygen use, oxygen application and interpretation of the oxyhemoglobin dissociation curve, he presented evidence of oxygen's numerous adverse effects, rare clinical benefit, and delay in diagnosis and appropriate therapy. By contrast, room air permits more gradual decline in oxygen saturation and tension facilitating earlier detection of problems of hypoxemia under anesthesia, earlier diagnosis of acute onset post op hypoventilation decreased exposure to oxygen radicals which may be involved in liver damage and higher rates wound infection. He questions the value of pulse oximetry as it doesn't decrease morbidity, and contends oxygen therapy should only be a bridging measure to appropriate therapy. Dr. John G. Laffey (National University of Ireland) spoke on *Hypercapnia: Permissive & Therapeutic*. He asserts permissive hypercapnia (PHC) can be a tool to decrease barotrauma, chronic lung disease, need for assisted or ongoing mechanical ventilation, and mortality and also improve neurologic outcomes and survival in a multitude of clinical conditions afflicting neonates/older children. Therapeutic hypercapnia (THC) can reduce pulmonary and systemic reperfusion-induced acute lung injury (reduced cytokines and anti-inflammatory effects). Buffering was seen as harmful, removing the protective effects of PHC. He addressed the potential for adverse effects of hypercapnia (impairment of phagocytosis of neutrophils in bacterial sepsis, poor wound healing, plasma membrane resealing), advocating titration of PHC in patients with elevated intracranial pressure, congenital heart disease or pulmonary vascular resistance.

Dr. Robert M. Spear (Children's Hospital, San Diego) moderated the final morning session *Trauma: Current Concepts*. Dr. Allison Kinder Ross (Duke University) lectured on *Pediatric Trauma Care: An Overview*. She opened with demographics—6.6 million children injured annually, trauma the leading cause of death in children under age 18; injuries the leading cause of death age 1-17 (orthopedic in school age children, intentional in age 10-17.) Basic information on airway management was followed by delineated differences in head, thoracic and abdominal trauma. She enforced attempts at peripheral intravenous should not delay care—spring loaded intraosseous devices/ bone injection guns are available, some can be inserted in the sternum while codes are in progress. Pediatric anesthesiologists must be prepared for managing more trauma patients with supraglottic airways in place (due to abandonment of field intubation in pediatric trauma patients), and more patients in the emergency room may have received etomidate and muscle relaxants. Formulation of hospital protocols limiting number of intubation attempts by emergency department personnel were recommended. Dr. Donald Sanderson Prough (Univer-

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sity of Texas) lectured on *Controversies in Fluid Management for the Trauma Patient*. After he opened with the consequences of inadequate and excess fluid resuscitation, he elaborated that fluid resuscitation is dependent on (1) patient variables (age and associated injuries) (2) stage of treatment (prehospital, emergency room, operating room and ICU) (3) Controlled (blunt) vs. uncontrolled (penetrating/non-penetrating) hemorrhage. Subgroup mortalities were examined—trauma, severe sepsis, and ARDS do worse with albumin (traumatic brain injury much worse), hypertonic saline shouldn't be used in TBI. In general, patients are over fluid resuscitated, goal-directed fluid therapy was advocated with monitoring and optimization of flow-related hemodynamic variables via central venous oxygen saturation, systemic oxygen delivery, esophageal Doppler corrected flow time, and transcutaneous PO<sub>2</sub>. Dr. Patrick M. Kochanek (Safer Center, Pittsburgh) closed with *Current Concepts Head Trauma*. He updated the audience since publication of Guidelines for the acute medical management of severe traumatic brain injury (TBI) in infants, children, and adolescents in 2003 and highlighted latest developments in neuroprotection. New imaging modalities that have diagnostic advantages over MRI such as susceptibility weighted imaging (in detection of microhemorrhage), fractional anisotropy (look at axonal misalignment and disturbances in axonal transport) were presented. Improved outcome with earlier decompressive craniectomy has been shown, while CSF drainage has not been shown effective. Biomarkers of brain injury such as neuron-specific enolase (NSE), S-100B protein, and in particular myelin basic protein (MBP) were enthusiastically heralded as “the next LFTs for PICU.” Lastly, he introduced new treatments such as minocycline (reduces microglial activation by inhibiting P38 kinase), cold shock protein (CspA) which reduced lesion volume in TBI in rats, ketones (bypass metabolic block in mitochondrion), antioxidants (target mitochondrion), MPI0 particles (superparamagnetic iron oxide particles).

### FRIDAY AFTERNOON REVIEW

Submitted by Dr. Cheryl K. Gooden  
Mount Sinai Medical Center

The Friday afternoon session, AAP Advocacy Lunch: “*Teen Driving Safety: What You Don't Know Could Kill Your Teenager*”, was moderated by Dr. Joseph Cravero (Dartmouth Hitchcock Medical Center). Dr. Flauro Koplin Winston (founder and co-scientific director of the Center for Injury Research and Prevention at Children's Hospital of Philadelphia) discussed the many issues surrounding teen driving. She highlighted several important statistics related to teen drivers in the United States and these are: 1) one in four crash fatalities involve a 16 to 24-year-old, approximately double that of other age groups, 2) the greatest risk of dying in a crash for teen drivers occurs within the first six months and first one thousand miles after licensure, and 3) seat-belt use is lower for teens compared with any other age group.

A video was presented that demonstrated teen driver risk factors for crashes such as inexperience and distractions. Measures



Dr. Gooden

to improve overall teen driver safety can be accomplished on many levels and some examples include physicians serving as advocates, as well as community and legislative advocacy efforts. An excellent resource for obtaining information on teen driving safety is [www.chop.edu/youngdrivers](http://www.chop.edu/youngdrivers).

Next it was time for *Jeopardy!* Dr. Myron Yaster (Johns Hopkins Medical Center) moderated this educational and entertaining session. The co-moderators were

Drs. Lynne Maxwell (CHOP) and Gregory Hammer (Lucile Packard Children's Hospital). The Jeopardy questions, as always, generated much audience participation and interesting discussions.

Refresher courses and workshops followed with a variety of topics presented. During the one to two hour sessions participants had the opportunity to learn more about some of the latest modalities in anesthesia practice and for some of these, gain hands-on experience.

## Saturday, April 5, 2008

### NEONATAL CORE SESSION

Submitted by Dr. Samuel Golden

University of Chicago

The Saturday morning program consisted of Problem Based Learning Discussions (PBLDs), 4 core lectures on neonatology, and the Abstract Award Presentations. A choice of 16 PBLDs were offered and were well attended. These 1.5 hr discussion sessions focused on management of difficult cases and anesthetic complications.

The core neonatology lectures began with Dr. Susan Hintz (Stanford University) lecturing on *Neurodevelopmental Outcomes of Preterm Infants: Perinatal, Clinical, and Sociodemographic Determinants*. Risk factors for long-term motor and/or cognitive deficits include cranial ultrasound findings (grade 3 intraventricular hemorrhage, intraparenchymal hemorrhage, peri-ventricular echodensities and leukomalacia), early hospital transfer (within 24 hours), male sex, neonatal sepsis/necrotizing enterocolitis, bronchopulmonary dysplasia, and lower rates of maternal education. Antenatal steroids are neuro-protective. MRI can better delineate white matter injury than ultrasound, and early data indicate that reduced total brain and gray matter volumes correlate with poor neurodevelopmental outcome. MRI is being used with increasing frequency in the neonatal population but its exact role in prognostication is still being defined.

Dr. Sanjeev Dutta (Stanford University) spoke on *Stealth Surgery: A Journey from “Small Scars” to “No Scars” in Pediatric Surgery*. Dr. Dutta discussed the revolution in minimally invasive surgical procedures (laparoscopic and thoracoscopic) in infants and children, including surgery for biliary atresia, choledochal cyst, tracheo-esophageal fistula, and pulmonary lesions. “Stealth” surgery is performed without leaving visible scars, including splitting of the sternocleidomastoid muscle for torticollis and excision of thyroglossal duct cysts and parathyroid adenomas using a

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trans-axillary approach. For lesions of the forehead such as orbital dermoid cysts, a scalp approach above the hairline can be used. Robotic surgery is beginning in children. Dr. Dutta reported that the emphasis on non-operative management for pediatric solid organ trauma has been extended to the management of gastroschisis. After reduction of viscera, a plastic dressing is applied over the defect. The fascia will spontaneously close and re-epithelialize over a period of 6-8 weeks. Dr. Dutta finished by showing an early prototype of a device for Natural Orifice Transluminal Endoscopic Surgery (NOTES). This surgical robotic device is designed to be placed in the stomach transorally and then passed through the stomach wall to perform "scarless" abdominal procedures.

Dr. Krisa Van Meurs (Stanford University) spoke on *Respiratory Distress Syndrome* (RDS). The 2 largest factors improving outcomes from this disease of premature infants have been the use of antenatal steroids and surfactants. Fetuses 24-34 weeks gestation at risk for early delivery should receive 2 doses of betamethasone 24 hours apart unless emergent delivery is expected. Betamethasone should be given at least 24 hours prior to, but not more than 7 days before delivery. Commercial surfactants are available as natural and synthetic products. Natural surfactants have been shown to result in a lower incidence of air leaks and improved survival. Surfactants can be used either prophylactically or therapeutically.

The incidence of BPD is 52% in infants having birthweight 501-750 grams, decreasing rapidly to 7% at 1250-1500 grams. Most centers use oxygen requirement at 36 weeks post-conceptual age for the clinical definition of BPD, but a newer, more objective definition has been proposed. This consists of a room air challenge for infants on less than 30% oxygen by nasal cannula. BPD is present when the oxygen saturation decreases to <90%. Volume control ventilation has gained popularity, particularly a hybrid mode termed "Volume Guarantee" ventilation, where both a tidal volume and maximal peak pressure are set. A recent meta-analysis showed volume control ventilation resulted in a decreased duration of ventilation and lower rates of pneumothorax and IVH compared with pressure control. Hypercarbia ( $P_{co2} > 60$  cm H<sub>2</sub>O) is associated with an increased risk for IVH whereas hypocarbia ( $P_{co2} < 35$  cm H<sub>2</sub>O) is associated with reduced cerebral blood flow and an increased incidence in periventricular leukomalacia and cerebral palsy.

Other therapies for prevention and management of RDS have been investigated. The following points were made: 1) postnatal dexamethasone treatment should be avoided due to several adverse effects, 2) high frequency ventilation does not improve outcome compared with conventional ventilation but may be useful as a rescue modality in selected infants, 3) the role of using nasal CPAP instead of endotracheal intubation is increasing in popularity, and 4) inhaled nitric oxide currently does not play a significant role in therapy for RDS.

Dr. Al Hackel (Stanford University) spoke on the *Anesthesiologist's Role in Disaster Planning*. Dr. Hackel, a director of the California Perinatal Transport System, described his experience helping to devise a coordinated disaster contingency plan for hospitalized high-risk maternity patients and critically ill infants in California.

Please go to the website for Abstract Awards and reviews submitted by Dr. Golden

### AAP BUSINESS MEETING "ASK THE EXPERTS" PANEL: ANESTHESIA FOR NEONATES – A CASE-BASED DISCUSSION"

Submitted by Dr. Linda Georges  
UNC Children's Hospital



Dr. Georges

The Saturday lunch clinical session was moderated by Dr. Constance Houck (Children's Hospital Boston). The presentation of common case scenarios continued the morning conference theme of anesthesia care for neonates.

Dr. Claire Brett (University of California San Francisco) presented the case of a term newborn, who presented for thoracoscopic tracheoesophageal fistula repair. The pros and cons of minimally invasive surgery (MIS) in newborns were discussed.

Smaller instruments and improved imaging allow MIS to be performed in very small patients. The advantages of MIS include decreased postoperative pain, improved cosmesis, and decreased systemic and local inflammatory responses. The postoperative incidence of esophageal stricture, leak, tracheomalacia and GE reflux have not decreased. The disadvantages of using a MIS technique include a small size patient, long surgical time, and thoracic insufflation in the presence of transitional physiology.

For the procedure, patients are positioned semi-prone with one arm over the head. One lung ventilation is not attempted. The insufflation of the chest should be performed very slowly (<1 LPM to a maximum pressure of 4-5 torr) with close attention to the infant's cardiovascular response. An FiO<sub>2</sub> of 1.0 may not be required if the SpO<sub>2</sub> is maintained in the low 90's. Hypercarbia and resultant changes in SVR and PVR appear to be well tolerated in most infants. Dr. Brett cautioned that the orogastric tube should be clamped prior to esophageal incision to avoid escape of the insufflated gas out of the OG tube.

No minimum patient size has been suggested for MIS procedures. An absolute contraindication to thoracoscopic TEF repair is patient hemodynamic instability. Relative contraindications include abdominal distension, complex congenital heart disease, and long gap esophageal atresia. Good outcomes require surgical expertise, intense interaction with the anesthesia team and close physiologic monitoring.

Dr. Nena Guzzetta (Children's Healthcare of Atlanta) discussed the case of a two month old, former 28-week premature infant, who presented for inguinal hernia repair prior to discharge from the hospital. The audience was polled as to their anesthetic management of such patients, and a majority of respondents preferred general anesthesia. When a regional anesthetic was used, slightly more clinicians used bupivacaine vs. ropivacaine. Very few were concerned about the neurotoxicity of local anesthetics or would

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change their anesthetic technique if laparoscopy was used.

The risk of life threatening apnea after general anesthesia in young infants has concerned anesthesiologists for decades. Dr. L. Liu's published reports in the 1980's were cited as landmark work in this area. She showed that pre-term newborns were at higher risk for postoperative apnea, particularly those who had a previous history of apnea. An increase in the performance of regional anesthetics for these patients followed.

More recently, many studies have compared the outcome of general vs. regional anesthetics for hernia repairs in these patients, and the results have been mixed. Regional techniques such as sub-arachnoid or caudal block have been used. Disadvantages include difficulty performing the block, block failure with conversion to general anesthesia and concerns about neurotoxicity of local anesthetic in newborns. The use of laparoscopy to examine the contralateral groin may be another disadvantage to the use of regional block.

In addition to the risk of postoperative apnea after general anesthesia in neonates, many issues remain to be resolved concerning the effects of our anesthetic agents on the developing nervous system. Translation of data from animal studies to humans must be kept in perspective.

Dr. Kirk Lalwani (Oregon Health and Sciences University) discussed the case of a one week old, 26-week premature infant, who presented for operative treatment of necrotizing enterocolitis (NEC). Anesthetic concerns include issues relating to prematurity, respiratory distress syndrome and NEC.

Oxygen toxicity is a major concern in the management of newborns. Multiple studies in infants have shown the effects of high oxygen concentrations resulting in increased retinopathy of prematurity, chronic lung disease, longer time to weaning, and possibly a higher incidence of cerebral palsy. Volume ventilation, shorter inspiratory times, and permissive hypercapnea have shown improved outcomes, including a lower incidence of pneumothorax and intraventricular hemorrhage, shorter ventilation duration, and improved neurodevelopmental scores.

The occurrence of NEC is inversely related to gestational age and birth weight and has a mortality rate of 55%. Its development is thought to be related to a myriad of causes including feeding, immature intestinal mucosa, bacterial colonization, inflammatory response, nitric oxide deficiency, a hypoxic ischemic event, necrosis of tissue and gangrene. On abdominal x-rays, air can be seen in the bowel wall (pneumatosis intestinalis). A less devastating form of NEC occurs in larger infants resulting in an isolated intestinal perforation. On x-ray this appears as free air in the peritoneal cavity.

Care of these infants in the operating room includes dealing with abdominal distension, aspiration, hypothermia, bleeding, coagulopathy, acidosis, electrolyte imbalance, shock and circulatory failure. Oxygen should be administered as needed to maintain an SpO<sub>2</sub> in the low 90's, short inspiratory times, small tidal volumes and peak airway pressures as low as tolerated. Dextrose maintenance fluids should be continued with volume supplemented by isotonic crystalloid, albumin or FFP, and blood.

Because NEC is such a devastating occurrence, aggressive efforts are being made to decrease its occurrence in NICU patients

including the feeding of breast milk vs. formula, probiotics and arginine therapy.

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## Sunday, April 6, 2008

### FUTURE OF RESEARCH

**Submitted by Dr. Toyin Olutoye**  
*Texas Children's Hospital*

*Sonosite lecture: Future of research in pediatric anesthesia-*  
Dr. Alex Evers, Washington University School of Medicine



**Dr. Olutoye**

Anesthesiology receives less federal research funding at < \$20,000 in NIH funding per faculty member compared to Internal Medicine where up to \$100,000 in federal funding is awarded per faculty. Data on 110 academic anesthesiology departments surveyed revealed only 55 were found to have any federal funding; 80% of which was concentrated amongst 15 academic departments. Little information is available for pediatric anesthesiology departments however less than half of pediatric anesthesia divisions have any funding at all (for research or training).

Possible reasons for this paucity of funding in Anesthesiology include:

- 1) Inadequate financial and human resources with 80% of anesthesia departments being understaffed.
- 2) Inadequate experience with federal funding amongst department chairs: survey of anesthesiology department chairs showed that < 30% had prior experience with funding. This percentage is probably much less among pediatric anesthesiology chiefs. This contrasts to Surgery department chairs amongst which 60% have some experience with funding.

Identified stalwarts to the success of research in Anesthesiology programs include:

- 1) Inadequate research requirements in residency or training programs. Extending the fellowships in Anesthesiology to two years or making research participation a mandatory part of residency training, could resolve this.
- 2) Lack of attractiveness of research to research oriented trainees. Provision of financial inducement for MD/PhD residents to enter Anesthesiology may attract more trainees interested in research.
- 3) Lack of mentorship for trainees and faculty.

Research trainees will more likely choose a given specialty over the other if there is an abundance of unanswered questions thereby allowing them to make significant impact in their area of interest. Similarly, Dr. Evers noted funding agencies would also allo-

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*Continued on page 9*

# Ultrasound: Is there a place for it in pediatric anesthesia?

*Note from the Editor: I was unable to find a newsletter contributor who would take a true "Con" side against the use of ultrasound. This fact alone almost speaks for itself, but I welcome any comments from others who would disagree and am happy to publish your thoughts. AKR*



## YES

**By Sean Flack, MD**  
*Seattle Children's Hospital*

The twin goals of peripheral nerve blockade (PNB) in children are efficacy and safety. Ultrasonography during PNB helps achieve these goals by permitting direct visualization of the block needle, target nerve and adjacent anatomic structures. Is there evidence that the use of ultrasound leads to improved outcomes in children? Admittedly, pediatric outcome studies are few in number and size, so the level of evidence is low and large multicentered trials are needed. That being said, numerous studies support the use of ultrasound for PNB in children.

Our patients vary considerably in size and shape to the degree that reliance on landmark techniques alone results in a high incidence of failed blocks. A number of studies have shown that the rate of block failure can be reduced by the use of ultrasound. Even the "bread and butter" blocks such as an ilioinguinal nerve block for inguinal hernia repair can be performed with improved success if ultrasound guidance is used.(1)

Both block procedure and onset time can be improved. A study of three-in-one blocks demonstrated an onset time that was approxi-

*Continued on page 10*



## NOT NECESSARILY

**By Chris Glover, MD**  
*Texas Children's Hospital*

Ultrasound use in regional anesthesia has become the poster child of what most would consider "cutting edge anesthesia." The first reported case, however, was performed by La Grange in 1978 (albeit with Doppler ultrasound). While I must admit I am very much a proponent of its use in regional anesthesia (as my colleagues can attest), I have been asked to describe the disadvantages of using ultrasound for this indication. I believe that these disadvantages can be broken into three broad groups: the learner, the equipment, and outcomes data.

There is no standardized teaching program in place. While there are a multitude of workshops, CME programs, and PBLD's available for interested learners, the best method(s) for instituting and teaching this technique remain unknown. Firstly, our operating rooms are leanly staffed so that it is difficult for the beginner to get the hands-on mentoring needed to acquire ultrasound skills. A learning curve definitely exists. Positioning the probe and interpreting the ultrasound scans are learned skills. Because of this, inexperienced ultrasonographers inevitably take more time to perform a peripheral nerve block, our surgical colleagues bemoan the

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## Session reviews, from page 8

cate funding to areas in which they feel the most impact would be made.

The decreased mortality rate with anesthesia (decreased from 1:100 in the 1800's to 1:187,000 in 2000) gives the general impression that anesthesia is now safe. This impression results in decreased innovation, resulting decrease in clinical reimbursements leading to a decrease in the number of anesthesiologists, and may be perceived as a deterioration in the specialty. Therefore there is poor funding for research and a decrease in the number of anesthesiology research trainees. There are however a number of unanswered questions that remain with regards to etiology of pediatric peri-operative mortality as well as the actual incidence for both inpatient and outpatient surgery. Dr. Evers charged us as a group to re-examine our mission and embrace perioperative morbidity and mortality as our problem in order to prevent the adverse outcomes of surgery. In fact the goal should be to prevent ALL adverse outcomes of surgery.

He outlined some unanswered areas for potential research which are unique to our field and these include:

- 1) The deficiency of adequate anesthesia and analgesia in premature babies, neonates and children with genetic anomalies and developmental pharmacology. The resulting research should investigate developmental pharmacology as well as pharmacogenomics.
- 2) Poor understanding of the effects of anesthetic agents on normal development or anesthesia induced neurodevelopmental apoptosis. This should instigate research studies in outcomes databases studies as well as in epidemiology.

He stated finally that while research is more sophisticated than in the past 50 years, the organizational separation of researchers from clinicians cannot produce intellectual excitement that will attract trainees and solve public health problems. Clinical involvement is necessary in order for researchers to detect areas of potential research.

He reminded us that there is tremendous opportunity to study specific areas in our subspecialty.

## Yes, from page 9

mately 50% faster with ultrasound (13 min) versus conventional methods.<sup>2</sup> Marhofer et al demonstrated an onset time of 9 min following ultrasound-guided infraclavicular blocks in children with ropivacaine 0.5%.<sup>(3)</sup> In the same paper, they also demonstrated that the duration of anesthesia and analgesia following PNB can be improved by the use of ultrasound.

Ultrasound can reduce the discomfort of regional anesthesia. For example, children with fractured limbs can undergo nerve blockade without the added pain of a nerve stimulator causing muscle contraction.<sup>(3)</sup>

Ultrasound may also reduce the complications associated with nerve blockade. Visualization of the needle and nerve may limit the incidence of nerve injury.<sup>(4)</sup> There are animal studies supporting this theory<sup>(5)</sup>, but the rarity of this complication makes it unlikely that a clinical trial will prove this assumption. The Pediatric Regional Anesthesia Network (PRAN) is a multicenter database that may in time offer some clarity to this and other controversies concerning regional anesthesia in children.

Systemic local anesthetic toxicity can be fatal and the use of ultrasound may reduce the incidence of this dreaded complication. Firstly, ultrasound guidance reduces the minimum effective dose of local anesthetic for PNB.<sup>(1,2)</sup> Secondly, visualization of the needle tip and adjacent vascular structures helps avoid accidental intravascular injection. Thirdly, ultrasound can differentiate an intravascular from an extravascular injection based on the pattern of local anesthetic spread.

Direct visualization of non-neural structures is another advantage of ultrasound. For example, visualization of the pleura during periclavicular blocks prevents accidental lung puncture, while the kidney can be seen and avoided during lumbar plexus block. Bowel can be seen and avoided during the performance of rectus sheath or ilioinguinal nerve blocks.

Cost is frequently raised as a reason to avoid the use of ultrasound. However, Sandhu showed that the cost of ultrasound versus nerve stimulator techniques is similar based on the assumption that the average cost per ultrasound-guided block is \$3.40 (machine, gel and noninsulated Tuohy needle) and the portable machine (Sonosite 180 model) is used for 5000 procedures.<sup>(6)</sup>

Labat stated in 1928 that “anatomy is the foundation on which the edifice of regional anesthesia is built”.<sup>(7)</sup> PNB is an exercise in applied anatomy and the use of ultrasound improves the anatomic knowledge of the user such that one’s ability to subsequently perform “blind” techniques is anecdotally improved.<sup>(8)</sup>

In conclusion, nerve blocks work when local anesthetic is optimally distributed around nerve structures. Ultrasound permits visualization of this goal and its use during PNB in children should be encouraged.

## Not necessarily, from page 9

performance of the blocks and/or find reasons why such blocks are inappropriate for a given patient. I believe that this surgical pushback has the potential to drive surgeons away from our learning institutions or to erode the social capital between surgeons and anesthesiologists in the operating room.

Equipment is also an issue. The cost of the equipment associated with implementing this method can be prohibitive and there are definite limitations to its use. Image degradation occurs with increasing depth of penetration, making ultrasound-guided blocks more challenging for deep blocks or for performing blocks in obese patients. Tracking the needle in the out of plane approach is also difficult, such that the needle position must usually be inferred by local tissue movement and local anesthetic spread. Other equipment limitations relate to ultrasound’s inability to penetrate bone, making neuraxial imaging particularly difficult. Acoustic artifacts, invariably present to some degree, may make interpretation more difficult for novices, and may result in inappropriate injection of local anesthesia. Nerves, too, may differ in appearance based on their size and surrounding structures, as well as the angle of the ultrasound beam.

The largest conundrum in advocating ultrasound’s use in regional anesthesia is the current lack of data regarding its benefits. Marhofer et al recently reported in *Anesthesia and Analgesia* that few studies have demonstrated overall improved block success rate using ultrasound guidance. The argument for ultrasound in rendering less pain by avoiding muscle contraction is rendered moot in pediatric anesthesia since the overwhelming majority of blocks placed in children are performed under general anesthesia (up to 89% per Giaufre et al).<sup>(2)</sup> Given the low complication rate of peripheral nerve blocks in children reported by Auroy, it is important to realize that the safety profile has not been demonstrated to be better with ultrasound guidance.<sup>(1)</sup> The French Language Society of Pediatric Anesthesiologists’ (ADARPEF) multi-institutional, prospective study on outcomes of pediatric anesthesia, similarly reported a remarkably low rate of complications. There are a growing number of case reports reporting nerve injury and vascular puncture, even with ultrasound guidance; these reports likely represent just the tip of the iceberg, since many practitioners are reluctant to report their complications.<sup>(3, 4)</sup>

Even with the limitations stated above, I remain a firm believer in the utility of ultrasound guidance in the practice of anesthesia. Ultrasound equipment continues to evolve with improved resolution and portability. Manufacturers are ensuring a supply of echogenic needles. Workshops covering ultrasound guidance remain ever popular. As more of us become comfortable with its use, I feel the use of ultrasound in regional anesthesia will be as commonplace as the incorporation of TEE in cardiac anesthesia.



References are available on  
[www.pedsanesthesia.org](http://www.pedsanesthesia.org).

# Subspecialty Certification in Advanced Pediatric Anesthesiology

By **Randall M. Clark, M.D., F.A.A.P.**

*University of Colorado School of Medicine*

*The opinions expressed here are Dr. Clark's and do not represent the official positions or policies of the American Society of Anesthesiologists.*

Here is a brief update on activities related to the Society for Pediatric Anesthesia's application to the American Board of Anesthesiology (ABA) for subspecialty certification in advanced pediatric anesthesiology.

As previously discussed in the newsletter, the SPA application went to the ABA last summer. In the fall of 2007, the ABA asked the American Society of Anesthesiologists (ASA) and other anesthesiology organizations for their opinion on the issue. The ASA, in turn, considered the issue at the ASA Board of Directors meeting in February of this year.

The ASA Board heard extensive testimony and debate on the subject. Unfortunately, the Board voted to oppose the application. As is normal for all ASA Board actions, the February decision will now go to the ASA House of Delegates at the October ASA Annual Meeting in Orlando where it will be ratified, modified, or overturned.

It was a disappointment to this writer that the ASA Board of Directors chose to take this position at this time. The ABA had made it clear in written and verbal communications that it would solicit input on the application from all interested parties and organizations through the end of 2008. It was explicitly clear that the ABA's timing was structured in a way to allow the ASA House of Delegates an opportunity to fully consider the issue in the fall and to give its collective opinion at that time. The February ASA Board decision does not seem to add to this process other than to now create a somewhat taller hurdle for the advocates of subspecialty certification to overcome.

The reasons for opposition are well known. Many feel that subspecialty certification is simply unnecessary; that ABA Board Certification confers qualifications in all of the subspecialty areas of anesthesiology. Others are concerned that subspecialty certification will imply that only certificate holders are qualified to provide anesthesia care for pediatric patients. This is neither the intent nor the desire of those advocating for subspecialty certification. As a result of these concerns and based on suggestions made at the February ASA Board meeting, the SPA Board of Directors voted at its meeting in April to change the title and focus of the application to subspecialty certification in advanced pediatric anesthesiology.

An interesting additional concern is raised by those who say that subspecialty certification creates a legal hazard for those practicing

in pediatric anesthesiology without the certificate of special qualifications. It is difficult to assess the validity of this concern. However, we do have the experience of other medical specialties that have gone down this road. In reviewing the available literature, and in discussing the issue with pediatric specialists in other areas of medicine, it does not appear that subspecialty certification has been a problem as far as legal liability is concerned. In medical malpractice actions, physicians are judged on whether or not their decisions and actions meet the prevailing standard of care. It matters little what sort of certifications one holds.

The final area of concern is voiced by those who run hospital departments and academic programs. Some of these leaders share a concern that the creation of another subspecialty area will make their staffing situations more difficult. Realistically though, subspecialty certification in pediatric anesthesiology should be no greater burden for program directors than those they face with the current subspecialty areas; critical care, pain, and palliative medicine. There is not, nor is there likely to be, a "Board police" checking programs to make sure they have some arbitrary level of subspecialty certificate holders.

The advantages of subspecialty certification are very real. Just like Board certification in general and the current ABA-recognized subspecialty areas in particular, subspecialty certification in advanced pediatric anesthesiology will provide a means to gauge the knowledge and problem-solving ability of those practicing in a distinct and very well-defined area of medicine. There can be no doubt that once subspecialty certification in pediatric anesthesiology exists, it will raise the bar for all practicing within the specialty. That, in turn, can only benefit our patients.

Though not as momentous as the issues currently facing our nation and our planet, this is still very much an issue worth the fight. For many, subspecialty certification in advanced pediatric anesthesiology is the next logical step in the development of our specialty. Rather than being seen as a disruptive threat, it should be seen as a means to improve the quality of those who choose to practice our special brand of anesthesiology, and by extension, the care we deliver for our pediatric patients.

*Randall M. Clark, M.D., F.A.A.P. is the ASA Director for Colorado and the Chair of the ASA Committee on Pediatric Anesthesia. He is an Associate Professor in the Department of Anesthesiology at the University of Colorado School of Medicine and serves as the Interim Chair of the Department of Anesthesiology at The Children's Hospital, now in Aurora, Colorado.*

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