

# Annual Meeting Review: October 13, 2006 in Chicago

**Helen Lauro, MD, FAAP**

The 20<sup>th</sup> Annual Meeting for the Society of Pediatric Anesthesia was held October 13 at the Chicago Marriott Downtown in Chicago, Illinois. Program Chair, Santhanam Suresh, M.D. (Children's Memorial, Chicago, IL) and SPA President Francis X. McGowan, Jr., M.D. (Children's Hospital, Boston, MA) provided welcoming remarks.

During the first morning session, moderated by Elliot J. Krane, M.D. (Stanford University, Stanford CA), Charles H. Berde M.D., Ph.D. (Children's Hospital, Boston, MA) lectured on Chronic Nociceptive and Neuropathic Pain in Developing Animals and in Children. He contrasted chronic neuropathic pain epidemiology, clinical course and management for a variety of disorders between infants and children and adults.

Benefits of cognitive based therapy (CBT) was emphasized, including decreased pain, improved function, and short-term benefits (i.e. improved gait and stair climbing) and long-term benefits (i.e. improved school attendance, better patient follow up). Neuroplasticity—the concept that we can change responses to outside perturbations like opioid administration, explains why younger children and adolescents get tolerant faster than adults do, resulting in profound opioid tolerance in PICU and pediatric oncology patients. As a correlate of this, the RAVE hypothesis explains why different opioids differ in activation of tolerance (methadone versus morphine); lower RAVE index opioids should be selected for chronic administration. In particular, infant strategies may include NMDA antagonists with clonidine to decrease tolerance. The “spared nerve injury model,”—illustrating lack of allodynia and neuropathic pain in rats less than 4 weeks of age may offer explanations neuropathic pain is uncommon before school age.

Shobha Malviya, M.D. (University of Michigan, Ann Arbor, MI) presented Assessment of Pain in Children, via “redefining 10”—i.e. a 10 pain score is different for a 12-year-old in sickle cell crisis and a 5-year-old falling off a bike; necessitating comprehensive pain assessment. Self-report pain methods (psychological) were elucidated including faces scale, Oucher (ethnic and gender bias), numerical scales (pain thermometers and pain ladders), poker chip tools, color scales (red/black = pain), pain words—small medium and big; it “feels like lightning” and pain interviews and pain questionnaires. Behavioral assessments including CHEOPS (Children's Hospital of Eastern Ontario Pain Scale), OPS (Objective Pain Score) and FLACC (Face, Legs, Activity, Cry and Consolability) scale were reviewed.

Unique pain behaviors should be sought particularly in cognitively impaired children such as those with cerebral palsy, as retarded children can show the same extent of pain as normal children. The interpretation of complex patient data and scientific principles of pain assessment was enforced as the best pain assessment practice for “pain as fifth vital sign.” We need not rely on physiological (biological) pain methods in infants—“state-of-the-art” pain tools in those less than one year old include the neonatal/infant pain scale (NIPS), the FLACC for the preverbal child, self-reporting in older children, but it is best to use all the tools in conjunction with each other.

K.J.S. Anand, M.D., MBBS, DPhil (Arkansas Children's Hospital, Little Rock, AR) discussed Neurobiology of Acute Pain in Children. Pathways of supraspinal processing of acute pain reveal that the lateral thalamic system provides content while the medial thalamic system provides context—when the two systems are “out of sync” acute pain may evolve to chronic pain. He touched on the controversial area of fetal pain with the current thinking that fetal pain occurs before late gestation—probably in second trimester. In the social context of pro-choice and pro-life issues, he voiced that if we accept that pain does occur during dismemberment of fetus, the pertinent question becomes should we administer lethal intra-amniotic injections to a fetus before termination.

Allison Kinder Ross, M.D. (Duke University, Durham, NC) moderated the second morning session “Non-pharmacologic approaches to



Who's Who at the Annual Meeting – Top row: Zulfiqar Ahmed, Jayant Deshpande, Frank McGowan. Bottom row: Joe Tobin, Peter Davis, Randy Flick and Shobha Malviya

pain management”, introduced J. Christian Abajian, M.D. (University of Vermont, Burlington, VT) who discussed Magical Distraction. Anxiety in young children has been associated with a more painful postoperative recovery; overall, distraction techniques reduce distress and are low cost interventions. Benefits of magic include a drug-free alternative to reducing anxiety, fun activity, easy to learn, enjoyed by children, no side effects and inexpensive.

Magic can be performed everywhere (preoperative holding area, starting intravenous, operating room, recovery room, endoscopy suite, and oncology unit), drawbacks are few—being called the “Magic man” and being asked for assistance for children with preoperative anxiety. Overall, anesthesiologists should not be lulled into thinking magic will work for all children—some children do require pharmacological therapy—magic works for some but not all children, potentially offering benefits post hospitalization. Video footage from “Magical perioperative experience” was shown to the audience.

Brenda Golianu, M.D. (Stanford University, Stanford, CA) spoke on Acupuncture and Complementary Analgesic Therapy; the goal being that the cycle of affective input to cognitive framework to pain sensation can be attenuated with alternative modalities. Cognitive based therapy can be utilized. Common acupuncture accupoints were illustrated such as the P6 accupoint injection effective in decreasing postoperative nausea and vomiting. Noninvasive methods of acupuncture such as accupressure can be very useful in children. Acupuncture can also be used in those on chemotherapy. Functional MRI video footage demonstrated performance of real acupuncture and effect on change in blood flow.

Sam R. Sharar, M.D. (University of Washington, Seattle, WA) presented Virtual Distraction, using the Snow-World immersion virtual reality tool for treating burn victims. Audiovisual (AV) distraction runs the gamut from television to video games to immersion virtual reality (VR); while we are all cost-conscious, not all audiovisual distraction is as effective. During burn physical therapy, pain scores are 40-50% lower with VR than with video games, and hold patient attention better as well. (Lesser AV distraction is cheaper but offers less effective analgesia). Components of the VR distraction system include a human computer interface, user immersion in virtual world (3D high resolution visual display, stereophonic sound, tactile feedback devices), and user interaction with virtual world (head and limb tracking, navigation by joystick).

Benefits include ideal techniques for brief painful procedures of mild to moderate intensity (diagnostic procedures, lumbar puncture, intravenous,

post operative physical therapy, dental pain, thermal ablation, cancer related procedures, and burn wound care.) as children find VR more immersive and real than adults. Limitations include little experience in extremes of age, simulator sickness with prolonged use, and significant cost of system (Hardware \$30-40,000).

Patrick Birmingham, M.D. (Children's Memorial, Chicago, IL) moderated the afternoon session "Pharmacological approaches to pain management," Julia C. Finkel, M.D. (Children's National Medical Center, Washington, DC) discussed Opioids and Non-steroidals (NSAIDs). A short review of the role of NSAIDs in premature and full term neonates and COX mediated prostaglandin (PG) production was followed with developmental implications of PG. Neonates treated with indomethacin have a 40% incidence of renal impairment. Sleep can be affected as PG suppresses nocturnal melatonin. COX-2 inhibition prevents prostacyclin and PGE formation, triggering pulmonary hypertension. Overall—little evidence for pediatric use of NSAIDs as first line analgesic, NSAIDs should be adjuvant to opioid analgesics.

Future analgesics, still in animal trials, include NO-releasing NSAIDs, which offer potent analgesia, decreased side effects and no hepatotoxicity (i.e. NO acetaminophen and NO flurbiprofen). On the subject of opioids, while neonates less than 7 days of age need less morphine, morphine does not provide adequate analgesia for procedural pain for premature babies and morphine use has not been found to reduce severe intraventricular hemorrhage, periventricular leukomalacia or death in preterm neonates on ventilators. Reasons postulated are immature receptors, morphine metabolism in liver. Overall there is insufficient data to determine pharmacokinetic and pharmacodynamic relationships for analgesia of NSAID or opioids.

Adrian T. Bosenberg, MB, ChB (Red Cross Children's War Memorial Hospital, Cape Town, South Africa) discussed regional anesthesia. The accuracy of a block can be improved with surface nerve mapping, nerve stimulation and ultrasound; pediatric challenges include definition of anatomy, complications not always apparent, toxicity and other complications. Paresthesias, which are only 38.2% sensitive, are not done in kids. Motor response to nerve stimulation less than 0.5 mA or even less than 0.2 mA are 74% sensitive, but are not necessarily "safe"—intraneural injection can occur at 0.6 mA (range 0.08-1.8 mA).

Nerve mapping can be used for the child under general anesthesia, as long as nondepolarizing agent is not administered until after the block. He proposes ultrasound to allow confirmation of placement, especially in locations where nerves are—benefits include fast onset, long duration, less pain, lower risk; drawbacks include high cost, learning curve, need space. Onset time of the block is reduced with ultrasound—a dose of 0.1ml/kg is the adequate dose for a successful block.

In case of a bupivacaine-related cardiac arrest, the use of 20% intralipid was advocated for resuscitation, through the mechanism of a lipid sink at the mitochondrial level. Resuscitation starts with 1 ml/kg of 20% intralipid over one minute, CPR, repeat intralipid every 3-5 minutes until total dose of 3 ml/kg. If patient responds, convert to 0.25 ml/kg/min. Propofol should be considered inappropriate for use as resuscitation i.e. not considered a substitute for 20% Intralipid.

Brenda C. McClain, M.D., DABPM (Yale New Haven Children's Hospital, New Haven, CT) discussed Newer Modalities for Pain Management. Perioperative uses of clonidine was reviewed including premedication, shivering, postoperative nausea, post operative pain, emergence delirium, and neuropathic pain. Dexmedetomidine is 1620:1 alpha 2 agonist with a wider dosing regimen effective in emergence agitation, premedication and procedural pain. Tizanidine is an alpha 2 agonist that can be used for chronic daily headaches, and is a muscle relaxant; lofexidine is pending for opioid withdrawal. Methadone has uses in decreasing neuropathic pain particularly in morphine tolerant burn patients (RAVE hypothesis) but we should be aware of potential toxicity if patient is on antifungals, antidepressants, or alternatively diminished efficacy when on anti-seizure medications or reverse transcriptase inhibitors. Ketamine should be considered for PCA in concert with morphine, prepared as a 1:1 mixture.

John B. Rose, M.D. (Children's Hospital of Philadelphia, Philadelphia, PA) discussed Chronic Pain Management. No evidence-based reviews exist for pharmacological interventions for chronic pediatric pain. The

analgesic effect of antidepressants is not established in chronic pediatric pain—when using tricyclics suicide, long QT syndrome, anticholinergic effects as well as tricyclic withdrawal syndrome are caveats to their use. Pizotifen is a serotonin antagonist/antihistamine not currently available in the USA. Anticonvulsants for pediatric pain, studied alone and in combination with tricyclics have limitations of higher adverse or serious adverse effects such as bone marrow suppression. Gabapentin is the preferred anticonvulsant with rare adverse effects, tramadol may decrease allodynia and paresthesias in neuropathic pain, lidocaine/mexiletine is superior to placebo for neuropathic pain with adverse effects 35% vs. 12 % placebo group. Propranolol and flunarizine may be effective in pediatric migraines. He recommended more multidisciplinary pain clinics with multi center collaboration to study pain conditions.

Tetsu Uejima, M.D. (Children's Memorial, Chicago, IL) moderated the final afternoon panel on "Medical informatics and quality assurance", and introduced Joseph P. Previte, M.D., F.A.A.P. (Cincinnati Children's, Cincinnati, OH) discussing Electronic Anesthesia Records, can we make them user friendly? He advises that President Bush proposed all hospitals have electronic documentation in 10 years, authorizing \$4 billion to study this nationwide, and many organizations such as Anesthesia Patient Safety Foundation ([www.apsf.org](http://www.apsf.org)), Institute of Medicine ([www.iom.edu](http://www.iom.edu)), and Society for Technology in Anesthesia ([www.anestech.org](http://www.anestech.org)) are promoting this initiative.

Computers will change the way we practice medicine—benefits will include formation of research databases, quality assurance tracking, education, and improved patient care. After an examination of many vendors with a site visit, our organization's expectations of a reliable, fast, mobile and secure enterprise-wide virtual tool have to be tempered with implementation considerations (workers, support staff, ancillary staff), equipment considerations (software, hardware), as well as education and training. Start-up costs can be 5% of a hospital's \$1 billion budget, with maintenance costs of 1% of budget/year (or approximately \$10 million/year). We should be aware that implementing an electronic anesthesia record in an average anesthesia department whose annual budget is \$30 million per year might cost between \$1-2 million in the first year.

Benjamin H. Lee, M.D., M.P.H. (John Hopkins, Baltimore, MD) discussed Minimizing Prescription-Writing Errors: Computerized Prescription Order Entry (CPOE). CPOE may decrease injury—the error rate in pediatric prescription practice has been estimated at 82%, with severe errors at 3.5%, and also save money. Reasons for the high error rate include weight-based drug dosing, misplaced decimals, and children having fewer developmental communication skills. Solutions include review by pharmacists, hospital review, computerized provider order entries, and clinical decision support systems. An Internet demonstration of a controlled substance scriptwriter highlighted the benefits to the audience.

David M. Polaner, M.D., F.A.A.P. (Children's Hospital, Denver, CO) substituting for Lynn D. Martin, M.D. (Children's Hospital, Seattle, WA), reported Database Management: the Pediatric Regional Anesthesia Consortium as Prototype. Retrospective studies report lumbar epidural complication rate as more than 1 in 1000, peripheral nerve block less than 1 in 1000; the ASA closed claims in pediatric regional anesthesia describes 0.3% of pediatric claims involved regional anesthesia, a French prospective study based on self-reporting reported an overall complication rate of 1 in 1000 with the risk highest for caudal epidural followed by lumbar then sacral epidural and last spinal. SPA is involved in a large prospective study to collect data by a web-based tool which is IRB anonymous and HIPAA compliant using the Axio® research corporation system. He anticipates that this database will identify and define the best practice centers, gather feasibility data for randomized trials, and create a collaborative network of pediatric centers.

Peter J. Davis, M.D. (Children's Hospital, Pittsburgh, PA) lectured on Awareness under Anesthesia: Where are we in 2006? After a review of the causes, psychological sequelae, and risk factors for awareness, he contrasted the incidence of pediatric awareness (0.8%) with that of adults (0.13%)—reasons postulated for the six-fold higher figure included lack of anesthesia on transport from induction to operating rooms. JCAHO has mandated anesthesia providers to prevent awareness and educate their staff

and identify patients with increased risk of awareness. Risk can be reduced with premedication of amnestics, administration of more than “sleep dose” of induction agents, avoiding total paralysis, avoiding muscle relaxants unless necessary, periodic maintenance of vaporizers and equipment, and being alert for patients on beta blockers and calcium channel blockers. Post op checks are critically necessary—half of all anesthesiologists do NOT perform them—medicolegally a “dead on arrival” for us. Patients who have risk factors for awareness (substance abuse, difficult intubation, chronic pain patients, cardiac patients, caesarian section patients, trauma, ASA IV-V and those hemodynamically unstable should have informed consent that awareness is a risk. Patients who nonetheless become aware should be referred to counseling programs. Dr. Davis suggests hospitals through support from their infrastructure set up databases to determine their incidence of complications and side effects.

Marina Vassi Panos, LEED, AP (VOA Associates, Inc., Chicago, IL) concluded with Chicago Architecture from White City to Green City. She traced the architectural evolution of the metropolis of Chicago from post 1871 fire (the only surviving building being the water tower) to Daniel Burnham’s design for Chicago with boulevard system connecting to parks and a forever-free lakefront. Early Chicago skyscrapers (Monadnock Building, Home Insurance Building, Wrigley Tower, Tribune Tower) as well as more recent buildings (IBM building, John Hancock, Sears tower, and Marina City) were presented. Future skyscrapers such as the Trump international tower (2008) which couple architecture to efficient energy design, and the Fordham spire were considered. Architectural considerations of McCormick Tribune, Navy Pier, Mill Park, Pritzker Pavilion, Crown Fountain and Cloud Gate were enjoyably examined. Chicago City Hall has a neoclassical style with a green roof and energy efficient design (look out New York City!). Websites were provided for additional architecture information ([www.architecture.org](http://www.architecture.org), [www.cityofchicago.org](http://www.cityofchicago.org), [www.chicagohistory.org](http://www.chicagohistory.org), [www.millenniumpark.org/artandarchitecture](http://www.millenniumpark.org/artandarchitecture).)

The conference was well received by the audience, who look forward to the Joint Winter meeting of the SPA and AAP Anesthesia section in Phoenix, AZ.