



Perinatal-Pediatrics Bulletin

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Notes from the Chair

by Timothy R. Myers BS, RRT

With fall just around the corner, most of us are gearing up for the busiest time of year in terms of pediatric asthma in our emergency rooms and hospitals. The AARC and the Environmental Protection Agency (EPA) have been working jointly on several projects over the past couple of years to increase awareness of pediatric asthma and indoor environmental triggers. In the not too distant future, some exciting resources for respiratory therapists and the patients and families they treat will become available from these cooperative initiatives. The AARC would like to thank all the section members and their institutions that participated in these joint AARC-EPA projects for their hard work and help.

Once again, the AARC Program Committee, led by Chair Patrick Dunne, has performed the impossible, reviewing over 500 proposals for lectures, symposiums, and workshops to schedule an exciting academic slate for the AARC International Respiratory Congress to be held in San Antonio this December. I am personally looking forward to some exciting lectures and dynamic speakers during programs focusing on our specialty and the diseases we treat. I encourage all of you to find your way to San Antonio to share in the upcoming International Congress.

As many of you are aware, every year the

Specialty Sections honor a Specialty Practitioner of the Year at the Awards Ceremony during the International Congress. I encourage all members to submit names of worthy candidates and colleagues for our section's award to myself or the AARC's Executive Office. The following individuals have volunteered to serve on the Perinatal-Pediatric Section's Practitioner of the Year Selection Committee: Kathy Davidson (UT), Allen Bylsma (TN), Heidi Palmer (TX), and Rita Sterler (IA).

I also encourage all of you to contribute to the *Bulletin* by contacting our co-editor, Doug Petsinger, or myself at the addresses or numbers listed on page 2. Even if you don't want to write an article, you may have topics that you'd like us to address in these pages, and we need your input to ensure that the *Bulletin* delivers the information you are most interested in reading.

Lastly, I want to encourage those section members who haven't already joined us on the perinatal-pediatric email listserve to do so. This is an excellent way to share ideas with your fellow section members around the country. Recent topics have included aerosol delivery, asthma education, NICU staffing patterns, availability of HFOV ventilators, and the use of hypoxic gas mixtures in hypoplastic left heart syndrome. ■

Notes from the Co-Editor

by Doug Petsinger, BS, RRT/RCP IV

I hope everyone is having an enjoyable summer. First, I would like to thank Theresa McClary and the Florida Society for Respiratory Care for inviting me to speak during their Summer Forum. I really enjoyed myself and made some new friends. The participation was excellent, and the content was great. During the conference I had the opportunity to see the soon-to-be-approved 3100B HFOV by SensorMedics. Wow! They had it on a pig lung, and it was amazing to see the rerecruitment over the day. Initially, the Paw was 50 cmH₂O, and by the end of the day the Paw was weaned down to 32 cmH₂O. Very impressive. I am planning on some new toys in the future.

I would like to thank Melissa K. Brown, RRT, for contributing another spectacular article in this issue — "Nasal Cannula for

NCPAP in the NICU." She brings several key points that we, as practitioners, must respect when using high flow nasal cannulas. Heat loss and positive pressure administration are two very big issues, in that they can trigger negative sequella that could increase length of stay or even harm the patient. Remember the motto, *do no harm*? Are we capturing nasal cannula/CPAP therapy in databases? Should we consider this therapy as a duration of mechanical ventilation? I agree with Melissa that further research needs to be done on this therapy.

Please keep either Timothy or me informed on new subject material or any articles that you want to publish in the *Bulletin*. All ideas/contributions are welcome. In the meantime, please enjoy this issue. I believe it's a good one. ■

Feeling Blessed

by Doug Petsinger, BS, RRT/RCP IV

The other day, I was attending my third "coaching" class in three years at Children's Healthcare of Atlanta. While role playing (my least favorite thing to do) I had to come up with a real life coaching experience. Although we often associate coaching with correcting negative behavior, the three examples I thought of were all positive experiences with three of my staff. Who can complain when you have two employees asking for more responsibilities in the CICU, such as data collection and composing case presentations? Or when the most serious coaching during an evalua-

tion is, "please be more proactive with your care and please trust your clinical judgment."

This coaching class got me thinking about how fortunate I have been in my career. So, naturally, the movie projector in my head turned on and I started contemplating the last 20 years. I, like many of my age, started out as an "on the job trainee" (OJT). My first experience with respiratory therapy was at Ohio Valley Medical Center (OVMC) in Wheeling, WV. I was hired with four other remarkable individuals: Becky, Terry, Dominick, and Judy. Together we grew from fledgling equipment techs to CRTTs. I cannot count the number of Bird IPPB machines we tore apart and rebuilt on a daily basis. I can still smell the Cydex. Do they still make the Silver Jackson Trach?

After three-plus years in the adult arena at OVMC, it was time for a change. When dealing with COPDers on a day-to-day basis, you tend to become friends, and it's tough when you see your friends succumb to their disease. What about neonates and pediatrics? What could be so bad with kids and babies? I always thought it was so cool when the transport teams came to our three-bed Level II NICU from either Columbus Children's in Ohio or Magee's Women's Hospital in Pittsburgh, PA. They must have thought we were a bunch of hicks using either a Bourmes

LS104 or a BP200. I guess we were hicks. So, early in my now broadening career the perinatal-pediatric bug bit me, and I was hooked.

In my quest to learn, I landed in Savannah, GA, at Memorial Medical Center. Thanks to CJ and her patience, I slowly learned neonatal ventilation and transport. My quest then brought me to Atlanta and Georgia Baptist Hospital. Then, finally, I ended up at what was then Egleston Children's Hospital (now Children's Healthcare of Atlanta). This is where my education in perinatal/pediatric medicine was fine-tuned. I would be rude if I did not thank several therapists for having the patience of Job while teaching me the things I needed to know to succeed. First, my very good friend and "Vulcan," Bert Kesser. I would not be where I am today if it were not for him. Next, is Esther Taylor, who is an excellent friend and a great sounding board. The opportunities to learn at Egleston were — and still are — endless. Think about learning HFOV and iNO from Dr. Reese Clark — and then later in the day, both of us meet again as we coach our kids on the soccer fields. I have had the pleasure to learn all aspects of ECMO from Dr. Devin Cornish and then become a primer. Finally, to be a part of a huge cardiac program is way beyond cool. I truly feel blessed and cannot wait to see what the next 20 years will bring. ■

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Perinatal-Pediatric Section

As part of an initiative to keep section chairs more informed about their section, the AARC sends section membership lists to the chairs at regular intervals. In the chart below you will view the geographical breakdown for the 1498 current members of the Perinatal-Pediatric Section.

Some interesting footnotes to the section membership include: section membership

spans 49 of the 50 states, and both Washington, DC, and Puerto Rico are represented. The top seven states contributing members to the section are: California, New York, Texas, Florida, Georgia, Pennsylvania, and Ohio. Another interesting item from this data is that 23 current section members reside outside the United States, representing 11 other countries. ■

AK	5	HI	4	MI	25	NV	8	TX	110	Argentina	1
AL	12	IA	11	MN	22	NY	113	UT	15	Brazil	2
AR	19	ID	8	MO	38	OH	68	VA	28	Canada	7
AZ	25	IL	56	MS	8	OK	14	VT	2	Denmark	1
CA	127	IN	44	MT	3	OR	16	WA	32	Hong Kong	1
CO	31	KS	20	NC	48	PA	69	WI	28	Italy	1
CT	25	KY	14	ND	8	PR	5	WV	9	Japan	1
DC	5	LA	31	NE	9	RI	6	WY	0	Military	2
DE	10	MA	42	NH	6	SC	21			New Zealand	1
										Saudi Arabia	2
FL	83	MD	31	NJ	46	SD	6			Sweden	1
GA	70	ME	10	NM	8	TN	21			Taiwan	3
										Total	1498

Nasal Cannula for NCPAP in the NICU

by Melissa K. Brown, RCP, RRT, NICU clinical specialist, Sharp Mary Birch Hospital for Women, San Diego, CA

Nasal continuous positive airway pressure (NCPAP) refers to spontaneous ventilation through the nose with positive pressure applied throughout the respiratory cycle. A continuous pressure applied to the airways restores functional residual capacity (FRC) and reverses hypoxemia caused by ventilation to perfusion mismatch by recruiting collapsed alveoli.¹ An increase in FRC results in an increase in lung compliance and a decrease in work of breathing. NCPAP appears to stabilize the chest wall and upper airway and reduce apneas.² Early application of CPAP might also preserve surfactant.³

The Cochrane collaborative generated recommendations for practice based on a thorough review and analysis of the literature. They conclude that, "NCPAP is effective in preventing failure of extubation and reducing oxygen use at 28 days of life in preterm infants following a period of endotracheal intubation and IPPV." The studies that evaluated nasopharyngeal delivery (long prongs) showed more adverse events (apnea, respiratory acidosis, and compromised oxygenation) than short prongs and suggested a clear advantage to short prong delivery, but still demonstrated improved outcome at 28 days.²

Nasal cannulas are utilized to deliver supplemental oxygen. Unlike conventional NCPAP devices, nasal cannulas do not have a mechanism to monitor or regulate the generation of excessive positive airway pressure. In one published study investigating the effects of high flow nasal cannula on pulmonary mechanics, the investigators actually quantified the pressure created with this device. In this study no distending pressure was generated with the 0.2-cm nasal cannula (infant) with flows up to 2 L/min, whereas the 0.3-cm cannula (pediatric) generated a mean pressure of 9.8 cm H₂O at 2 L/min flow. The size of the

cannula in relation to the size of the neonate's entire nasal passage is what determines positive pressure delivery. Therefore, it is still possible to deliver CPAP with the smaller cannula in certain neonates. It was the conclusion of this study that using nasal cannula to deliver CPAP is inherently unsafe.⁴ Equally concerning would be the possible lack of CPAP delivery, due to cannula size selection, in light of the Cochrane recommendations for practice.

Large volumes of air passing the nasal mucosa can cause increased nasal resistance, nasal congestion; dry nose and mouth, sore throat, and a bleeding nose.⁵ Other symptoms, such as headache, chest discomfort, and infections of the nose, throat, and sinus, may also occur, and the mucociliary transport system is slowed.⁶ To avoid the dangers of mucosal drying in a healthy adult it is necessary to deliver at least 30.6 mg/L of humidity.⁷ The need for 30.6 mg/L may explain why bubble humidifiers that only deliver 1.6 to 7.4 mg/L to air have had limited success in reducing symptoms.⁸ The heat loss from the respiratory tract depends on the temperature of the inspired gases and the ventilation rate. For a 1kg infant, the total body temperature can be lowered by 0.72°/hr. Humidify the gases with a heated humidifier and no respiratory heat loss will occur while maximizing secretion clearance of the lungs.⁹

More research studies need to be done to explore the clinical effectiveness of nasal cannula CPAP, as well to investigate the possible negative consequences of delivering cool, poorly humidified gases to the neonate.

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Neonatal/Pediatric Trach Tube Cross Reference

by Lois Rowland, BS, RRT, RPFT, Perinatal/Pediatric Specialist, respiratory clinical coordinator, Johnston-Willis Medical Center, Richmond, VA

The Official Statement of the American Thoracic Society entitled "Care of the Child With a Chronic Tracheostomy" includes guidelines for the supplies and equipment that should be available for a child with a chronic tracheostomy. Recommending that a tube of the same size be with the child, it states that a tube one size smaller also be available for insertion if a caregiver is unable to replace the same-size tube after accidental decannulation.

Respiratory therapists are relied upon to assure that appropriate airway equipment is at the bedside. Frequently, it is necessary to have a catalog number for a tracheostomy

tube to request supplies from a central distribution area which may not always have the exact brand of tube that a child may be using in stock. The following cross reference chart can assist in obtaining the proper tracheostomy tube:

"Care of the Child With a Chronic Tracheostomy," The Official Statement of the American Thoracic Society, was adopted in July 1999 and can be accessed through the ATS website, www.thoracic.org. ■

In Part One of this article, I outlined the

Neonatal/Pediatric Trach Tube Cross Reference

Legend: Cat. No./I.D. mm/O.D. mm/Length mm

BIVONA	SILLEY/MALLINCKRODT	
CUFFLESS	Previous Product	New ISO Product
Neonatal		
60N025/2.5/4.0/30		
60N030/3.0/4.7/32	00NT/3.1/4.5/30	3.0NEO/3.0/4.5/30
	0NT/3.4/5.0/32	
60N035/3.5/5.3/34		3.5NEO/3.5/5.2/32
	1NT/3.7/5.5/34	
60N040/4.0/6.0/36		4.0NEO/4.0/5.9/34
		4.5NEO/4.5/6.5/36
Pediatric		
60P025/2.5/4.0/38		
60P030/3.0/4.7/39	00PT/3.1/4.5/39	3.0PED/3.0/4.5/39
	0PT/3.4/5.0/40	
60P035/3.5/5.3/40		3.5PED/3.5/5.2/40
	1PT/3.7/5.5/41	
60P040/4.0/6.0/41	2PT/4.1/6.0/42	4.0PED/4.0/5.9/41
60P045/4.5/6.7/42		4.5PED/4.5/6.5/42
	3PT/4.8/7.0/44	
60P050/5.0/7.3/44		5.0PED/5.0/7.1/44
60P055/5.5/8.0/46	4PT/5.5/8.0/46	5.5PED/5.5/7.7/46

Childhood Brain Tumors and the Environment: Part Two

by Frank G. Rando

various avenues for exposure to toxic substances which may play a role in childhood cancers. Let us now assume that an individual or developing fetus has a genetic pre-disposition which may increase susceptibility to these substances, or that the individual is immunocompromised or otherwise "at risk." We now have even greater risk or probability that the subject may have a deleterious effect from a chemical exposure.

The genetic-environmental interactions in neoplastic disease are complex and occur at the biomolecular level. Thus, molecular biology and epidemiology have formed an intimate bond, and a new science has been born: molecular epidemiology. Molecular epidemiology was developed as a logical branch of epidemiology to specifically address environmental disease in populations and the biochemical and genetic-environmental connection.

We know, for example, that some environmental toxins/carcinogens, such as benzo[a]pyrene, which is a ubiquitous environmental contaminant, form DNA adducts. This close relationship of environmental chemicals and genetic material has led to a fundamental scientific understanding of how and why some chemicals mutate or otherwise thwart control mechanisms of human cells, thus allowing cellular transformation and aberrant cell growth, i.e., cancer.

In pediatric brain cancer, for example, the sensitivity of fetal nerve tissue to some transplacental agents, and the finding of somatic mutations in childhood gliomas, are consistent with causal exposures occurring during pregnancy — although lipid-soluble chemicals (e.g., hydrocarbons) could be stored in the mother's body during the pre-conception period and exert their effect during a later pregnancy (Hemminki K, et al, Genetic risks caused by occupational chemicals: use of experimental methods and occupational risk group monitoring in the detection of environmental chemicals causing mutations, cancer and malformations. *Scand J Work Environ Health*; 1979; 5:307-327).

Lipid solubility is important because cell membranes are composed of phospholipids and the brain contains large amounts of polyunsaturated fats that serve as a protective

mechanism but are subject to free radical attack. Many toxic chemicals and their metabolites generate free radicals, which in turn damage cell membranes and genetic material. Also, many lipid-soluble toxins get stored in the body's adipose tissue, where they can be released later.

Although the blood-brain barrier offers selective protection of brain matter to many substances, it can be damaged by toxic metabolic free radical mechanisms, allowing xenobiotics to diffuse and migrate to vulnerable brain cells. Some inhaled toxins may also travel via olfactory mechanisms and oxoral transport to affect nerve tissue. Unfortunately, we are surrounded by a sea of lipid-soluble environmental toxins that can cause genetic mutations and developmental abnormalities. And as mentioned previously, gametes, developing fetuses, infants, and children are at great risk from these insidious and pervasive exposures.

When I was affiliated with the New York City Committee for Occupational Safety and Health and the Hunter College Graduate Program in Environmental Health, I distinctly remember seeing a poster designed by the Safety and Health Committee of the International Atomic and Chemical Industry Workers Union. The poster depicted in colorful, cartoon fashion a young couple in bed, leery about engaging in sex due to two smiling, 55 gallon drums of unknown industrial chemicals staring at them by the edge of their bed. It was a light-hearted portrayal of a sinister and insidious public health program.

In his landmark book, *Generations at Risk*, physician and public health expert, Ted Schettler, MD, MPH, describes in detail how environmental contamination and occupational chemical exposures affect unborn generations — infants and children, as well as adults. I also highly recommend *Our Stolen Future*, by Theo Colburn, PhD, which vividly describes the scientific mystery surrounding wildlife/human health connections associated with environmental contaminants that mimic estrogenic hormones. I also recommend *Living Downstream: An Ecologist Looks at Cancer and the Environment*, by Sandra Steingraber, PhD, breast cancer survivor and

research scientist. This is an eloquent, yet scientifically accurate, account of environmental cancer epidemiology. Additionally, there exists an excellent four part video series produced by the University of Vermont entitled, "Health and the Environment: Exploring Critical Connections." The set contains a video especially relevant for RTs entitled, "Health Effects of Air Pollution: Asthma/Bronchitis," but the other videos are just as relevant, fascinating, and disturbing. I suggest that all RTs and other health care providers read these books and examine these timely videos.

To summarize, childhood cancer in general is on the rise. Childhood brain tumors have increased during the past 20 years alongside an unprecedented growth in synthetic chemical production, toxic releases into the general and occupational environments, and relevant findings that many chemicals act as initiators and promoters of carcinogenesis, disrupt endocrine function, thwart reproduction and development in animals and humans, and may be at least partially responsible for several degenerative diseases. There are significant correlations between occupational and community environmental exposures and childhood cancers, including childhood brain tumors such as astrocytomas and primitive neuroectodermal tumors (PNET).

The mechanisms and factors involved in the epidemiology of cancer are complex, and further research is required to elucidate these mechanisms and factors, identify susceptible individuals and populations, and formulate effective public health policy to address these environmental health concerns. Our role as responsible clinicians must include the preservation and restoration of the environment and the diligent protection of public health. As perinatal and pediatric specialists, we must recognize the special threat, including pediatric cancer, that environmental contaminants pose to infants and children.

The legacy of environmental stewardship will be appreciated by our children and those generations yet unborn. Maybe, via our collective efforts, our rounds through the oncology wards will become a thing of the past. ■

The AARC Online Buyer's Guide
Your Ultimate Resource for Respiratory Product Information
<http://buyersguide.aarc.org>

ARCF Receives Endowment from VIASYS Healthcare

The American Respiratory Care Foundation (ARCF) and VIASYS Healthcare have established a new fellowship designed to recognize outstanding original research in the field of neonatal and pediatric intensive care. The VIASYS Healthcare Fellowship for Neonatal & Pediatric Therapists places special focus on bench studies, clinical research studies, and other qualified studies that involve mechanical

ventilation. Recipients will be selected by the ARCF Board of Trustees based on abstract submission.

The recipient of the fellowship will be presented a \$1000 cash award, a plaque, registration and airfare to the AARC International Respiratory Congress, and one night's lodging in the convention city. The first recipient(s) will receive their cash prize and plaque at the 2001

AARC Congress Awards Ceremony, which will be held December 1 in San Antonio, TX.

VIASYS Healthcare is comprised of Bear Medical Systems, Bird Products Corporation, and SensorMedics Critical Care.

If you would like more information the ARCF awards program, go to www.aarc.org/arcf/awards.html or call Diane Shearer at (972) 243-2272. ■

Literature Search: Kids & Asthma

As summer turns into fall, most pediatric RTs will be busy treating acute exacerbations of asthma in their hospitals and emergency rooms. Here's a rundown of the latest scientific studies aimed at increasing our knowledge of childhood asthma and how to treat it:

Obesity and asthma: The Tucson Children's Respiratory Study found that girls who became overweight between the ages of 6 and 11 were seven times more likely to develop new asthma symptoms at ages 11 and 13 than girls who did not become heavier. However, the authors don't believe being overweight causes asthma. Rather, they note that obesity appears to influence female sex hormones and that this, in turn, alters asthma risk. (*American Journal of Respiratory and Critical Care Medicine*, 5/01)

Interventions work: Canadian researchers say the best way to manage asthma after an unscheduled visit for an acute exacerbation is to provide patients with an action plan, teach them proper inhaler techniques, and provide them with access to a 12-month educational intervention aimed at improving their ability to control their disease. After six months, the percentage of patient visits to the outpatient clinic and emergency department among those who had these interventions became much lower than for two other groups that received more standard care. In addition, at 12 months, a much higher percentage of the intervention group were

using their asthma self-action plan. (*American Journal of Respiratory and Critical Care Medicine*, 5/01).

Reevaluate, please: Doctors who do not periodically reevaluate their patients' asthma severity are failing to provide good care, say Johns Hopkins physicians. They looked at patients with moderate asthma who had originally been estimated by their physicians to have either mild or moderate asthma. When they compared results for the two groups they found that doctors gave many more moderately asthmatic patients guidance and information about how to manage their symptoms and handle an attack. Roughly 60% of the moderate cases, for example, had a peak flow meter, compared to only 16% of the mildly asthmatic patients. (*American Thoracic Society*, 5/01)

On the home front: Investigators from Children's Mercy Hospital in Kansas City, MO, found that homes of children treated for asthma contained higher fungal allergen levels than homes of other allergy clinic patients. Participants submitted a sample of dust taken from their vacuum cleaners and completed a short questionnaire concerning the source of the dust and the general home environment. Analysis of 47 dust samples showed that 50% of the homes contained fungal allergens, with levels significantly higher in the homes of asthmatic patients. Dust samples from all homes contained detectable cat allergen, and 80% contained detectable mite allergens.

(*Annals of Allergy, Asthma & Immunology*, 5/01)

Specialist care lacking: Asthmatic children insured through Medicaid are less likely to see a physician who specializes in asthma care than children who get their health insurance through other types of managed care plans, say investigators from the University of Michigan Health System. They found that 21% of 886 children with asthma saw a specialist during the studied period. But far fewer of the Medicaid-insured children visited a specialist, a disparity that persisted even when patients' ages, length of time in the insurance plan, copayments for doctor visits, and asthma severity were factored out. (*Pediatric Academic Societies/American Academy of Pediatrics meeting*, 4/01)

Children shortchanged: Researchers from the University of Rochester's Children's Hospital at Strong have found that many asthmatic children aren't getting the right medications or speaking regularly with health care providers about their symptoms. In a study involving 168 children ages 6 to 19, they found that only 47% of children with moderate to severe asthma used a preventive anti-inflammatory medication. Further, the proportion of children having contact with a health care provider during the three-month study was 50% or less, even among the children experiencing almost daily symptoms. (*Pediatric Academic Societies meeting*, 4/01) ■

Get it on the Web

Want the latest news from the section in the quickest manner possible? Then access the *Bulletin* on the Internet! If you are a section member and an Internet user, you can get your section newsletter a week and a half to two weeks earlier than you would get it in the mail by going to your section homepage at: http://www.aarc.org/sections/section_index.html.

You can either read the *Bulletin* online or print out a copy for later.

The AARC is encouraging all section members who use the Internet to opt for the electronic version of the *Bulletin* over the mailed version. Not only will you get the newsletter faster, you will be helping to save the AARC money through reduced printing

and mailing costs. These funds can then be applied to other important programs and projects, such as ensuring effective representation for RTs on Capitol Hill.

To change your option to the electronic section *Bulletin*, send an email to: mendoza@aarc.org. ■

Specialty Practitioner of the Year

Don't forget to nominate a fellow section member for Specialty Practitioner of the Year! Submit your nomination online at: www.aarc.org/sections/peri_pedi_section/mpoty/poll_form.html. ■

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