American Association for Respiratory Care's

Neonatal Pediatrics

September / October 2002 Bulletin

Notes from the Co-Editor

by Melissa K. Brown, RCP, RRT

We have two informative articles in this edition of the Bulletin. The first, from David Blackney of Sutter Memorial in Sacramento, CA, summarizes the new products available from Dr. Forrest Bird to provide percussive and high frequency ventilation. As I've mentioned in a previous Bulletin, I, personally, have found the results from percussive therapy to be quite impressive. David has quite a bit of expertise in this area, and we appreciate his willingness to share it with us.

Our second article, by Alan Roth of Mount Sinai Medical Center, is the first installment in a series we'll be running over the next few issues on dealing with ethical issues concerning low birth-weight and handicapped infants. Any RT who has spent time working in the NICU has probably come to realize that medical ethics has not really kept pace with medical technology. We recently had 24-week gestation quadruplets in our NICU. Our staff had very strong feelings about the appropriateness of therapy being offered to these babies. As RTs, we are often placed in the awkward position of providing life-sustaining treatment that we may strongly disagree with. The discussions become even more difficult when the issue of religion enters into the decision-making process.

In my experience, parents are put in the unenviable situation of making life and death decisions with limited knowledge or medical sophistication. I have often wished parents could see what we have seen in our professional careers dealing with the medical effects of cerebral palsy. Seeing the effects of long mechanical ventilation courses, spinal fusion surgery, pneumonia, surgical jaw thrusts, tongue reductions, muscle releases, G-tubes

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Neonatal-Pediatric Specialty Practitioner of the Year: Melissa K. Brown, RCP, RRT

The Neonatal-Pediatric Section is proud to honor Melissa K. Brown, RCP, RRT, as our 2002 Specialty Practitioner of the Year.

According to long-time friend and colleague Rebecca Nichols, Melissa's accomplishments over her 12 years as a respiratory therapist run the gamut from exceptional devotion to her patients to exceptional service to her profession. In addition to her role as NICU clinical specialist at Sharp Mary Birch Hospital for Women in San Diego, CA, Rebecca says Melissa"is recognized nationally and internationally for her numerous, highly notable contributions to our profession."

Over the past year alone she has had papers published in RESPIRATORY CARE, the journal Respiratory Therapy, and in a textbook titled Perinatal Pediatric Respiratory Care, and was profiled in Advance Magazine for Respiratory Care. She is known across the nation as an expert in neonatal-pediatric RC, and often travels to other NICUs around the country to provide advice and answer questions regarding state-of-the-art practices, particularly the implementation of heliox programs.

When she's not involved in these activities, Melissa works with her local educational program, where she has developed a new graduate internship program for neonatal respiratory therapy. She will also be presenting two lectures and an abstract during the Open Forum at the AARC International Congress in Tampa this October.

Last, but certainly not least, Melissa is an active member of our section. Since January, she has been serving as co-editor of the Bulletin, ensuring that this publication is full of the targeted information we need to advance our careers in neonatal-pediatric care.

Melissa will receive the award during the Awards Ceremony at the Congress. Congratulations, Melissa! ◆

Ethical Issues Concerning Low Birth Weight or Handicapped Infants: Part One

by Alan Roth, MS, MBA, RRT, FAARC, director of clinical operations; clinical instructor, school of medicine, department of anesthesiology, Mount Sinai Medical Center, New York, NY

Editor's Note: The following is the first in a series of articles by Alan Roth on the ethical issues we all face as neonatal-pediatric practitioners. The series will continue in the next issue of the Bulletin.

There is no more devastating event that can befall parents than the birth of an abnormal, seriously ill, or extremely premature infant. About 3% of all infants born in the United States have major birth defects. The spectrum of congenital illness is vast and includes birth defects resulting from a complex interaction of genetic and environmental factors. Many of these defects are potentially life threatening, while others pose severe impediments to a normal existence. When clinicians are weighing the issues involved in a decision to discontinue treatment for severely defective newborns, the need to examine serious questions regarding the child's ultimate quality of life cannot be understated.

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ETHICAL ISSUES CONCERNING LOW BIRTH WEIGHT OR HANDICAPPED INFANTS:PART ONE

Case study

It is three o'clock in the morning and a mother arrives in our emergency room after awaking to find her bed stained with blood. She is in her 23rd week of gestation and has previously had a fetal death. Upon examination by the obstetrician, she is found to have a placenta previa, requiring an immediate c-section. The team is called in and we set up for delivery. Mom is worried, and understandably so: she had an amniocentesis at eight weeks that revealed Tay-Sachs disease, but decided to continue with the pregnancy anyway.

The baby is born at 3:40 a.m., a little girl with an Apgar score of 0-2. She is intubated with a 2.0 endotracheal tube and CPR is initiated. At five minutes we have a heart rate of 110 but no muscle tone or spontaneous respirations. The infant is taken to the ICU and placed on a mechanical ventilator. Artificial surfactant is delivered via the endotracheal tube. The infant is only 450 grams. We have to place her on a warmer with plastic wrap to maintain her body temperature.

Mom visits the infant six hours later after recovering from the anesthesia and surgery. She sees many lines of fluid going into the infant and monitors that show heart rate, respirations, blood pressure, oxygen saturation and carbon dioxide levels. Through her tears, she tells the staff, "No matter what, I want everything done for my child." The neonatologist talks to Mom and tries to explain that the extreme prematurity and congenital defect make it highly unlikely that the child will live and that she should consider removing the child from life support to allow her to die a peaceful death with the help of medication and comfort measures. Mom refuses and will not leave the bedside.

The doctor suggests a meeting with the hospital bioethics committee, which has just recently been set up to deal with these types of issues. But no agreement as to the course of care can be reached between family members, the committee and physician. The hospital legal counsel, along with risk management, suggests going before a judge to withdraw life support. While the hospital pursues a legal remedy in court, the infant suffers an intracranial bleed and dies.

In Part Two of his series Alan will delve into the specific issues facing health care professionals when cases like this one arise. ◆

Never Too Young to Avoid Salt?

Can an inborn taste for salt lead to high blood pressure?

Maybe, say researchers who tested 283 healthy babies to determine if their sucking response to the taste of salt or sugar was associated with a difference in blood pressure. Within three days of birth some babies exhibited a unique response to salty taste – and the response was strongest in babies who had at least one grandparent with a history of hypertension

According to the authors, who published their study in a recent issue of Hypertension: Journal of the American Heart Association, babies with a taste for salt had "blood pressures that averaged 5 millimeters of mercury (mmHg) or more higher than babies who had an aversive or neutral response to salt." They believe these findings suggest that salt taste response in newborns might be a "proxy measure of salt sensitivity."

The investigators emphasize that they did not actually feed the babies salt. Rather, the infants were exposed to a tiny salt or sugar taste stimulus on the tongue. Because blood pressure is not routinely measured in healthy newborns, they also did not compare blood pressure measurements to normal or set values as would be done in adults. Instead, they grouped infants based on the sucking response to water, water and sugar, and water and salt taste. The rate of sucking was measured by the rate of sucking that followed each stimulus - increased sucking indicating a preferential response and decreased sucking an aversive response. ◆

NOVEMBER IS COPD AWARENESS MONTH

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NOTES FROM THE CO-EDITOR

and fundoplication and convalescent home living would be an eye opener for families making lifetime decisions in the NICU.

Unfortunately, we still cannot predict with certainty the developmental outcome of all our neonates. And every once in a while a baby we are sure is destined for a lifetime of disabilities surprises us by becoming an "A" student and living an apparently full life. I am often amazed at how much we still have to learn about the human brain, and I am hopeful we will have better tools to help caregivers and families make better decisions in the future.

Something else that I have been noticing lately is the number of therapies routinely utilized in the NICU and PICU that are supported by nothing more than anecdotal evidence. Frequently, I investigate the literature in the course of introducing new technologies, developing protocols, or educating our staff. Often I find there are no or scant literature supporting the current practice. It's truly shocking. Even worse, there are many therapies we routinely practiced in the past that have since been revealed to be harmful. Even after there have been quite a few negative publications, sometimes there is an unwillingness to halt the practice.

I'm not speaking only about my institution, but the community as a whole. For example, those of you who have been in the field for a while may remember hyperventilating neonates with PFC (now PPHN) and head trauma patients. Does anyone else recall pH goals of 7.6? What looked like an effective therapy in the short term turned out in the long-term to be a recipe for profound brain injury. When I think back on all the neonates who received steroids to shorten their ventilator course, and the number of those babies who are now profoundly disabled due to our intervention, I am deeply disturbed.

These experiences and many more like them have prompted me to be more skeptical of new therapies that lack evidence on which we can evaluate patient outcomes. It's not that I won't use new things, because that is definitely not the case. I actively introduce new therapy and technology all the time. It's just that I am more skeptical and I look for evidence-based medicine to back up the case reports.

Another good example of practice outstripping the evidence is the proliferation of nasal cannulae to deliver nCPAP in the NICU. I distinctly remember when the very first article was published on this topic in 1993. I was working in an NICU, and the medical director immediately began ordering high flow cannulae (2 liters). Ironically, the authors of the study concluded that, due to the potential to provide PEEP levels as high as 10 cmH20 and the negative effects on work of breathing, the device was not safe for CPAP delivery. I have used this therapy for almost ten years now, and as the years have gone by I have also come to doubt the advisability of this delivery device. I have seen positive responses, but I've seen some negative things as well, and I have wondered about the overall effectiveness of the therapy.

Since that first article, three others have all concluded that nasal cannulae should not be recommended as deliver devices for nCPAP, for a myriad of reasons. Yet every day I hear from a new institution that is adopting this practice.

The AARC publishes Clinical Practice Guidelines to guide us in our development of policy and our decision-making process, and the foundation for these guidelines is the medical literature. As RTs we are frequently behind the drive for new practices. We should also be behind the drive for some good, randomized, controlled trials to verify the safety and efficacy of all the therapy we deliver. ◆

Kids Getting Healthier

A recent federal report indicates America's children are becoming healthier. According to the sixth annual "America's Children: Key National Indicators of Well Being, 2002," infant mortality rates are dropping, teen pregnancies are on the decline and children are more likely than ever before to have health insurance. Says HHS Secretary Tommy Thompson, "Today's report gives us the opportunity to rededicate our efforts as a nation, and as individuals, to protect children, provide them opportunity and good example, and build foundations that will last their lifetime." ◆

Percussionaire®: What's New

by David Blackney, RRT, Sutter Memorial Hospital, Sacramento, CA

Over the last couple of years, Intrapulmonary Percussive Ventilation (IPV®) has been reviewed and utilized by various providers, in home care, subacute care, the clinic and the hospital, who have implemented the technique in intensive care units, floor units and on transports. There has been a lot of discussion and numerous success stories regarding Dr. Forrest Bird's IPV® and VDR® (Volumetric Diffusive Respirator) 3C and 4.

Fundamentally, this technology is based on concepts we all learned in Respiratory 101 concerning flow and time and a few basic physic laws. Too often we, as practitioners, are so caught up in space-age looking devices that the basics are tossed out the window. As respiratory care practitioners we should take an IPV treatment to get a better understanding of (1) how to explain this therapy to a patient and/or family, and (2) how to adjust the control knobs.

Through a scientific design called the Phasitron ®, high flow mini-burst (100-1000 cycles per minute) of air are injected into the lungs, maintaining a continuous pulmonary wedge pressure (increased FRC). Other basic components include ventilation, diffusion and perfusion.

Dr. Bird has developed several new devices stemming from the Percussionaire® fundamental technology of the Phasitron® "ventilation at the airway." During a recent lecture, he stated that in order to improve his products he goes against himself.

Here's a brief overview of what's new:

- The Oscillatron® 2B is a Bi-Phasic (push-pull) Oscillator for the neonatal, pediatric and adult populations. The Bi-Phasic Oscillator Cartridge developed and patented by Dr. Bird reduces the inspiratory-expiratory-inspiratory transition from 20 milliseconds to under 7 milliseconds at a higher frequency. The ease of operation enables the professional practitioner to understand and use this device efficiently.
- The TXP®-2D is an updated version of the VDR®-3C in a durable high impact box. Not only can the TXP®-2D be utilized as a conventional ventilator, it can also be used as a high frequency ventilator, for differential lung ventilation, and/or to ventilate two patients simultaneously. It is about half the size of a VDR-3C and can be easily mounted in a transport isolette.
- The IPV®-1C is an updated version of the IPV-1 in a durable high impact plastic box. This device provides an effective means to mobilize secretions and/or stabilize the peripheral pulmonary airway, increasing alveolar ventilation.

Here at Sutter Memorial Hospital in Sacramento, CA, Percussionaire® products are among the adjunct therapies utilized to increase FRC, mobilize endobronchial secretions, provide saturated aerosol, improve gas exchange and exercise the lungs. They are utilized in our special care nursery, special care pediatric unit and for adults and out-of-house transports. ◆

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Problems Linger for Preemies

Scientists at the University of Arkansas for Medical Sciences have found that premature babies are more likely to suffer long-term learning and behavioral problems than babies born full-term.

Their statistical analysis of 20 years of research conducted around the world confirmed that children born prematurely have much lower cognitive scores and more behavioral problems after the age of five years than children born full-term. These findings, say the scientists, call for "concerted efforts of clinicians and neuroscientists to (study) the biological, environmental and psychosocial mechanisms responsible for these cognitive and behavioral differences."

The researchers note that children born prematurely have been found in numerous studies to have "huge differences" in cognitive scores, and to be aggressive or withdrawn or suffer from attention deficit hyperactivity disorder. However, many of these studies used a variety of population groups and research methods, making the body of knowledge about the effects of pre-maturity questionable.

In this study, investigators initially analyzed 227 studies, but eliminated those that had methodological problems before drawing conclusions from the remaining studies. They believe their analysis should "eliminate controversies" about the importance of prematurity for long-range outcomes. However, they emphasize that while the relationship between prematurity and later learning and behavioral problems is now clearer, the actual causes of these problems in children born prematurely have yet to be completely determined.

The investigators speculate that the medical complications of prematurity; the painful medical procedures that many premature babies experience in hospitals and prolonged separation from their mothers all may contribute to lower-than-average brain development and thus to later learning and behavioral problems. They also point to the stress and depression that having a premature baby can cause for parents, particularly mothers, as a potential factor in the children's later developmental problems.

The study was published in the August 13 issue of JAMA. ◆