



Perinatal-Pediatrics

Mar./Apr. '00

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for Respiratory Care**

Notes from the Chair

by Peter Betit, RRT

Once again, I was pleased with the attendance at our annual section meeting, which was held in Las Vegas during the AARC Congress. Over 30 perinatal/pediatric specialists from 12 states attended. It was great to see colleagues from past years and meet new ones. Here is a synopsis of that meeting:

- Attendees were given an opportunity to contribute topics for next year's Congress, which will be held in Cincinnati, OH in October. Since then, a number of excellent topics have been submitted to the Program Committee and tentatively approved. Some of the highlights include symposia on pediatric respiratory failure, cystic fibrosis, and childhood asthma.
- Jenni Raake, RRT, our section's Specialty Practitioner of the Year was acknowledged. (Please see related article in this Bulletin.)
- The position of listserv coordinator for our section was posted. As I have previously indicated, the listserv coordinator will post queries to our section's listserv and monitor responses and general activity. All interested parties should contact me. If necessary, this position can be rotated among a number of individuals.
- There was a fair amount of discussion regarding our listserv. Many attendees expressed dissatisfaction with the list-

serve, mainly due to difficulties in maintaining subscriptions and logging on. I have since brought these concerns to the AARC, which will monitor them. Please refer to the instructions in this Bulletin on how to subscribe to and navigate our listserv. The listserv has great potential for enhancing the flow of communication among section members, so don't hesitate to let me know if you are continuing to have difficulties. The AARC is placing greater emphasis on the website and listserves as an expeditious means of communicating with its members and conducting its business.

- I announced that our next section chair would be elected by the section membership. By now you should have received information on the nomination and election process. Nominations were due by February 16, and elections will occur later in the year. I am pleased to announce that since our section has over 1000 members, the next chair will have a seat on the AARC Board of Directors.

The hour went by very quickly, and it appears that our section is off to another good year. The AARC Congress was a great success, the perinatal/pediatric presentations were excellent and well attended, and the Open Forum continued to be a great source for spirited discussion. ■

Introducing Jenni Raake, RRT: 1999 Perinatal-Pediatric Specialty Practitioner of the Year

by Peter Betit, RRT

I first met Jenni Raake, our section's Specialty Practitioner of the Year for 1999, a couple of years ago at one of our section's annual meetings, and I knew then that she was a committed and dedicated practitioner. Jenni is the respiratory clinical coordinator of the cardiac intensive care unit at

Children's Hospital Medical Center in Cincinnati, OH. Her colleagues praise her clinical expertise and leadership in both cardiac and pediatric intensive care areas. She is a valuable resource to physicians,

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nurses, RTs, and students, particularly in the areas of cardiopulmonary physiology, ventilator management, and weaning. Jenni has also developed expertise in advanced modalities, such as inhaled nitric oxide, high-frequency ventilation, and surfactant administration, and is the clinical liaison

for point-of-care testing programs for unit-based ABG and electrolyte analysis.

On the volunteer front, Jenni chairs the research committee for the Ohio Society for Respiratory Care and has participated in a number of research activities. She has also been an Open Forum presenter for the past

few years and has lectured at a number of local and regional conferences. Jenni has served as guest editor of this Bulletin and actively participates in other section activities as well.

Accolades Jenni Raake! ■

Responsible Use of Inhaled Nitric Oxide

by Jeryl Huckaby, RRT, Children’s Healthcare of Atlanta, Eggleston Campus, Sibley Heart Center/CICU, Atlanta, GA

Now that inhaled nitric oxide (iNO) has been approved by the Food and Drug Administration (FDA), respiratory therapists are faced with their greatest challenge: when to say yes, when to say no, and when to say when.

The literature includes study after study on the successful use of iNO in many different patient populations, but unfortunately, the use of a control and long-term follow-up is sadly missing in many. Only in the population approved by the FDA has there been data to show that the use of the gas can safely and effectively reduce the use of extracorporeal membrane oxygenation (ECMO).^{1,2} In one study, iNO actually improved outcome in the treatment group as compared to the control group.¹ The following statement appears on the FDA web page³:

“INOMax (inhaled NO) in conjunction with ventilatory support and other appropriate agents, is indicated for the treatment of term and near-term (>34 weeks) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension, where it improves oxygenation and reduces the need for extracorporeal membrane oxygenation.”

However, before rushing the use of NO, we should remember that, in some patients, pulmonary hypertension can be treated by using a little common sense. By looking at the chest X-ray, it is easy to assess endotracheal tube placement, lung expansion, and the absence (or presence) of airleak. Ways to improve lung inflation include (but are not limited to) adjusting the endotracheal tube, the correct use of high frequency oscillation, and surfactant replacement therapy. Optimizing lung inflation and cardiac output will improve ventilation-perfusion matching, leading to increased oxygen delivery.

In anticipation of approval by the FDA, a consensus conference, sponsored by Pediatrix and INO Therapeutics, was held in October, 1999, in Fort Lauderdale, FL. Experts gathered to review the literature and develop basic guidelines on the use of NO. The following is a brief synopsis of the discussions.

The Duke Neonatal iNO Registry⁴ has collected data on over 300 neonates treated

with iNO. According to the registry, NO has improved oxygenation in term and near term neonates with the diagnoses of meconium aspiration syndrome, pneumonia, respiratory distress syndrome, and idiopathic persistent pulmonary hypertension. Ninety percent of neonates treated with iNO were admitted to the NICU by 39 hours of age (median admit age of 8 hours) and were on treatment gas by 59 hours of life, with the median start age of 21 hours. The data also showed that meconium aspiration syndrome was the most common diagnosis treated, with respiratory distress syndrome having the greatest success in improvement. It is important to note, however, that the data from the Duke registry are skewed, as most of the centers contributing are ECMO centers taking care of critically ill neonates. Data on less ill neonates is likely to be different.

Congenital heart disease must be ruled out in neonates presenting with severe hypoxemia before considering iNO. Increasing pulmonary blood flow in neonates with left ventricular failure (or absence) and/or pulmonary obstruction can lead to pulmonary edema, along with a number of other unfavorable results.

Numerous studies have shown that patients with congenital diaphragmatic hernia do not respond to iNO like the other diagnoses listed above. But while they may not show immediate results, iNO may stabilize some of these patients until surgery and/or the use of ECMO may be initiated.

As stated, iNO can reduce the need for ECMO, but it does not eliminate the need altogether. Recent literature shows that as many as 35% of critically ill neonates treated with iNO may still require ECMO. Therefore, a non-ECMO center using NO must be capable of transporting a patient on iNO. Easy as it sounds, transporting a critically ill patient on iNO is fraught with problems. The half-life of NO is 2.5 msec⁵, so even the briefest loss of delivery (as can

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occur with moving the patient to the transport isolette) can have hazardous results.

Not all patients placed on NO have an immediate response, but defining treatment failure is difficult at best. NO is useful in the treatment of reversible pulmonary hypertension, but does not always prevent the progression of the neonate's disease process. The Duke Neonatal iNO Registry suggests that those with no response to the drug within 4 hours of treatment will probably not respond at all. Data from the Duke Registry also show that only 20% of neonates who have an oxygenation index ($Paw \times FiO_2 \times 100 / PAO_2$) greater than 40 for 4 hours and are treated with iNO survive without the use of ECMO. Neonates with an oxygenation index (OI) > 40 for 4 hours probably should be cared for at an ECMO center.

NO was first used on neonates around 1992, and since that time, numerous dosages have been studied. The most recently completed study¹ started NO at 20 ppm for up to 24 hours, then lowered the dose to 5ppm for a period of time not to exceed 96 hours of total use. This study showed that the patients treated with NO (as compared to control) had a lower need for oxygen at 30 days of life. The duration of mechanical ventilation, length of stay, and occurrence of intracranial hemorrhage were similar in the treatment and control groups.

The literature has shown that NO has toxicities that are dose and duration dependent, meaning that the higher the dosage and the longer it is used, the greater the risk that toxicities will occur. Two toxicities of NO that are easy and necessary to monitor are the formation of methemoglobin and nitrogen dioxide (NO₂). Methemoglobin occurs when NO combines with the hemoglobin, causing a decrease in the oxygenation capacity of the red blood cell. It is recommended that methemoglobin levels be drawn within 4 hours of starting therapy, then every 24-48 hours after that while the gas is in use. Usually, levels > 5 gm/DL are considered toxic.

NO₂ is formed when NO comes in con-

tact with oxygen. Due to the fact that most of the neonates are on high levels of oxygen while being treated with NO, NO₂ must be monitored continuously. NO₂ can cause an increase in acid production and platelet dysfunction, and can damage surfactant, as well as DNA⁶. The Datex-Ohmeda iNOvent, currently the only NO delivery device with FDA approval, has an NO₂ monitor built-in for continuous readout. With doses at 20 ppm or less, NO is fairly stable, even in the presence of oxygen, as long as there is a continuous flow of gas in the system. NO₂ levels at this dose are usually below 1 ppm (5 ppm is considered toxic).

It is very important to remember that abruptly stopping NO can cause profound hypoxemia, even in those patients without an apparent response. It must be anticipated that the oxygenation will deteriorate following the discontinuation of iNO in responders as well as non-responders. It is recommended that the NO be weaned slowly (by half) to a level of 5 ppm once oxygenation has been stabilized. Once at 5 ppm, it may be necessary to wean by 1 ppm until off. Transient decreases in oxygenation may be managed by increasing the FiO₂.

There are no current data that show how long iNO can be used safely. However, the median time of iNO treatment in neonates is 44-88 hours, and most studies show that 90% of the treated patients are weaned off by 7 days of life. These data suggest that neonates who do not wean off within 7 days should be further evaluated.

The above guidelines were developed using the most recent literature, and while their use is recommended, it is also understood that changes may need to be made as the study of respiratory failure and NO progresses. The FDA approval of the use of NO in neonates > 34 weeks gestation with reversible pulmonary hypertension opens the door for the gas to be used indiscriminately. We owe it to our patients to use it responsibly. However, this does not mean that iNO should not be used in other patient populations. On the contrary, we also owe it

to our patients to discover who is most likely to benefit from this important new drug. But in doing so we must follow the protocols, collect data, and do long-term follow-up on these patients. It is by doing things properly that medicine has advanced the development of drugs and techniques that safely and effectively treat patients.

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The Respiratory Therapist and Case Management: Moving Out of the Box

by Claudia Schaffler, BS, RRT, case manager, PICU, Children's Healthcare of Atlanta at Egleston, Atlanta, GA

Approximately three years ago, after 20 years in the field, I started to consider other career options for myself. I was hoping to find something less physically taxing, and I needed to try something new, learn different skills, and find a position that would allow me to remain competitive in the market place. But I also wanted to take advantage of my 12 years seniority at my current job. As it turned out, I was able to accomplish all of those goals. My progression into new areas mirrors the changes that have occurred at my hospital over the past few years.

At Children's Healthcare of Atlanta at Egleston, we have decentralized our respiratory care department, lost our director, and struggled to maintain our professional integrity. After decentralization, many of us found ourselves working in departments managed by RNs. But we forged ahead, assuming leadership positions and taking on responsibility for areas to which we had not previously been exposed.

For example, I was asked to work with a committee that did open and closed medical review of charts in preparation for JCAHO and HCFA reviews. We met at least monthly to review charts for medical as well as surgical patients, many with no respiratory component. Another committee I served on was involved in creating charting forms for physicians and staff that would be more time efficient and still meet charting guidelines. It soon became apparent to me that it was impossible to deal with these issues without looking at how charting affected reimbursement. Thus, the natural progression for me was to move toward case management.

The responsibilities of the case manager position here at Children's are: "To monitor and coordinate patient care under the hospital's utilization management program. To assess, plan, implement, coordinate, monitor, and evaluate the options and services required to meet an individual's health needs, using communication and available resources to promote quality, cost-effective outcomes." When I read a little further into that definition, I realized that those cost-effective outcomes have a direct impact on those of us who have traditionally worked at the bedside. Let me explain.

"Reimbursement" and "cost-effective" are dirty words to the bedside clinician. We

rarely consider reimbursement. Although we have become more cost conscious in recent years, we haven't given much thought to other financial aspects of patient care. But when hospitals downsize and reduce staff, the bottom line is always money. With salaries making up a large chunk of the cost of running a hospital, the best way to cut expenses is to eliminate salaries by eliminating caregivers. Good case management can produce positive, cost-effective outcomes. And if hospitals can realize cost savings from these outcomes, those savings should translate into fewer financial cuts across the board, hopefully reversing the trend to cut back on the bedside clinician.

As a clinician, I felt like I was able to make a difference. I wanted to continue to make a difference. Could I do that without being clinical?

I decided to give it a shot. First, I approached the medical director of the utilization review (UR) department. She was quite honest with me when she said she had never considered an RT for this position. I pointed out to her that over 50% of the patients admitted to our facility have a primary respiratory diagnosis. An even larger percentage has a respiratory component. Because of my broad clinical experience, I felt confident that I could review charts with any diagnosis. As an RT, I covered all services, whereas most RNs are limited to one clinical area, such as cardiac or hematology.

As soon as a position became available, I applied. I emphasized my experience on various hospital committees, as well as my broad clinical background. I expressed interest in tying reimbursement to good case management. The UR director was very enthusiastic about my joining the team. What I wasn't prepared for was the response of the other case managers — all RNs, of course. Very soon the hospital was abuzz with talk of whether I could do a job traditionally held by nurses. The UR staff meetings were quite contentious I am told, with about half the nurses adamantly opposed to my getting the job and half believing that I should be given a chance. It appeared that the medical director was not the only one who had never considered an RT for this job! But, ultimately, I was offered the position and accepted. I give my director much credit for advocating for me

and hiring an RT in a traditionally RN department.

I was initially assigned as the case manager for the general pediatric floor, which consists mostly of children with respiratory problems. It was interesting, and not difficult to learn. However, within three months a position became available for a case manager in the pediatric intensive care unit (PICU). One of the physicians I had worked with in the PICU requested that my director consider me for the job. There were two things involved in this move that I was not totally aware of at the time. The first was that the critical care group of physicians was looking for someone to help them with their reimbursement. Since I was already doing chart reviews, I had proposed that I work with them on reimbursement. I liked the challenge of learning coding because that is how reimbursement is determined. If I could demonstrate that having a clinical person coding at the bedside could increase reimbursement, I could create a model for the rest of the hospital. This model could potentially have a huge impact, as we have a large number of hospital-based physicians here at Children's Healthcare of Atlanta.

The second thing that was happening was that most of the nurses in the UR department were not interested in doing case management in the PICU. They had never worked in the PICU and were unfamiliar with the drugs and technology. As an RT, I had spent several years rotating in the PICU and most recently was a member of the PICU RT core and transport teams.

Again I was offered the job and accepted; the fact that I am an RT rather than an RN has never been an issue. In fact, when I am giving clinical review to a case manager at an insurance company, I can dazzle them a bit with my ECMO, HFOV, and nitric oxide "lingo."

My new position is working out well on all fronts. Professionally speaking, I am currently setting up a system to track reimbursement and coding in order to maximize both. The group I am working with is small and very supportive, and I also have the help of one of our hospital auditors, as well as staff in the business office. On a personal level, I have succeeded in furthering my career, learning new skills, and changing

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people’s minds about what a respiratory therapist can do. The clinician with knowledge of reimbursement, including coding and case management, is extremely marketable. No one wants to compromise bedside care, but neither can we ignore the

financial aspects of that care.

As respiratory therapists, we are all in an excellent position to branch out and take advantage of our broad clinical experience. We can do that by thinking outside of the box and seeking new opportunities. In

health care, the individual who can maximize the hospital’s reimbursement is indispensable. If you can learn these skills on the job, all the better! Accomplish this legally and ethically, and your RT credentials will spell success! ■

Accidental Extubations and PI/CI

by Doug Petsinger, BS, RRT/RCP IV

Performance improvement (PI) and continuous improvement (CI) are essential for the development of a professional practice. We generally target infections (pulmonary, blood, or urine) in our surgical population, and any time there is a noticeable increase, we start to question our practice. “How long did we keep the central lines in?” “Did the foley catheter stay in too long, or did the patient arrive with a UTI?” “Is this truly a pneumonia or just colonization?” Then, like all inquisitive clinicians, we look for safe and realistic ways to improve our practice.

The comment by our chief thoracic surgeon that, “there are too many accidental extubations in the CICU, and we should address the problem,” recently started the wheels of PI/CI turning here at Sibley Heart Center. Truthfully, I began by explaining to both the surgeon and my manager that our accidental extubation rate is very low; in fact, the lowest of all three ICUs at the hospital. But that said, I realized that both thoracic surgeons and nurse managers are “fact driven creatures,” so data must be collected. Hence the “Accidental ETT Extubation QA Sheet” was created. This sheet required the clinician to answer 11 questions concerning the extubation. These questions were, for the most part, objective:

1. How long has the child been intubated?
2. Was the tape intact and secure?

3. Had Benzoine® been used to secure the tube?
4. Was the child restrained at the time?
5. Was the child moving around in bed?
6. How old is the ETT?
7. Were you doing procedures at the time (i.e., weighing, bathing, etc.)?
8. Was the patient paired?
9. Was an ETCO2 monitor in use?
10. What type of tape was securing the tube?
11. Did the child have copious secretions (oral or tracheal)?

We did not inquire about the type of intubation since we rarely utilize nasal endotracheal tubes. The QA data sheet was collected over the next full quarter, and the results were less than spectacular. There were 15 reported accidental extubations during that time frame.

The QA sheets targeted secretions, repositioning the patient, patient movement, and finally, restraints. However, eliminating copious secretions pharmacologically with Robinul® (Glycopyrrolate) has a downside in a patient population that is already fluid restricted and on diuretics, and neither did I believe that plugging off an airway or an endotracheal tube was necessarily the answer.

Luckily, we, as a group in the Sibley Heart Center’s CICU, are developing a shared governance philosophy in the man-

agement of the unit, and both professional practice counsel and performance improvement counsel play a large role in improving the standard of care in the CICU. In this case, a problem was identified, QA was performed, and factors were targeted to enhance improvement. In the professional practice counsel, we (RNs and RTs) all agreed that reeducation of the staff in proper positioning of the patient, eliminating torque on the endotracheal tube, sedation practices, and utilization of restraints would be the key educational issues. Once the educational component is accomplished, we hope to see a marked decrease in accidental extubations.

My question to you: have you experienced a similar problem with accidental extubations? What steps have you taken to overcome this problem? Do you have a mandatory method of taping an endotracheal tube? Are you using a tube fastener system? Are nasal endotracheal tubes more common than not? When weighing your patients, are you using an in-bed scale or lifting the patient out of bed? Do you routinely use sedation scales to control excessive patient movement?

If you care to respond to any or all of these questions, please contact me at the addresses/numbers listed on page two. I’m very interested in learning more about your practice. ■

Journal Watch: Check These Out!

by Peter Betit, RRT

I recently came across a couple of publications that I thought section members would be interested in. The first publication consists of an excellent compilation of reviews devoted to pediatric respiratory failure. The journal is *New Horizons* (New Horizons: The Science and Practice of Medicine Volume 7, Number 3, Fall 1999), a quarterly publication from the Society of Critical Care Medicine (SCCM). I found these reviews to be well written and highly comprehensive. Topics covered in the com-

pilation include:

- Successes and Failures in Pediatric Acute Respiratory Failure
- Airway Mechanics in Health and Disease
- Biological Markers of Acute Lung Injury: Prognostic and Pathogenic Significance
- Current Therapies for Severe Asthma Exacerbations in Children
- Upper Airway Obstruction in Children
- Respiratory Syncytial Virus-Induced Respiratory Failure in the Pediatric Patient

- ARDS or Why is She Dead?
- Noninvasive Mechanical Ventilation and Respiratory Care
- Mechanical Support of Acute Lung Injury: Options for Strategic Ventilation
- Weaning From Mechanical Ventilation
- Role of Inhaled Nitric Oxide in the Treatment of Children with Severe Acute Hypoxemic Respiratory Failure
- Surfactant in Pediatric Respiratory Failure

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