Perinatal-Pediatrics Bulletin
March/April '99

Monograph Review: RSV And Asthma

by Peter Betit, RRT

The American Thoracic Society (ATS) recently published a CME monograph titled "RSV and Asthma: Is There a Link?" The purpose of this monograph and related conference was to elucidate some of the theories regarding childhood asthma and its relationship to viral infections of infancy. While no absolute conclusions, consensus, or recommendations were made, some interesting points were raised.

There seem to be two views regarding the link between respiratory syncytial virus (RSV) and childhood asthma: one is that severe RSV infections do contribute to the development of childhood asthma, and the other is that viral infections in infancy actually protect against asthma. In a 1994 study, it was observed that middle-income white children who were infected with RSV as infants had a lower incidence of asthma. However, recent data suggest that the national increase in asthma among children is predominately associated with inner-city black males — the same population that is predisposed to viral infection in infancy. In general, the rate of hospitalization for asthma and RSV are increasing, and low-income children are at greater risk. Overall, it is somewhat unclear if RSV has a contributory or a protective role in the development of childhood asthma.

Another topic covered in this monograph focuses on the procedures for diagnosing RSV. The diagnosis of RSV is confirmed through laboratory analysis of a nasal wash or nasal aspirate. Some laboratory tests are more sensitive than others and have fewer false positives or false negatives. Standard cell cultures tend to be susceptible to sample handling error and are labor intensive. Immunofluorescence and enzyme immunoassay are more rapid and relatively inexpensive. It appears that immunofluorescence is most sensitive and has reasonable specificity. The accuracy of the diagnostic assay depends on the quality of the clinical specimen and the speed with which the specimen is transported to the lab.

The use of bronchodilators and corticosteroids in the treatment of RSV is also discussed. Both beta2-adrenergic agonists and alpha agonists have been clinically studied. Basically, it appears to be a toss-up between Albuterol and racemic epinephrine. Most of these studies utilized subjective clinical scoring as the measurable outcome. One other difficulty in studying bronchodilator effect is the poor deposition of aerosol particles that is inherent in the delivery of aerosolized medications to infants. Nonetheless, the monograph suggests that bronchodilators should be considered and may temporarily relieve breathing difficulties. It is also suggested that the use of corticosteroids does not alter the course of RSV and does not have any synergistic effect with bronchodilators. However, steroids may be beneficial in patients in which steroid use has been successful, such as those with chronic lung disease of infancy.

Ribavirin is also reviewed in the monograph. In one study it was suggested that the prevalence of subsequent reactive airway disease was reduced in patients treated with Ribavirin. Patients who meet the American Academy of Pediatrics (AAP) criteria for Ribavirin use seem to benefit the most. Retrospective data suggest that in these cases the need for asthma medications was less than in those not treated. The AAP guidelines for Ribavirin include patients with

"Monograph Review" continued on page 2

American Association for Respiratory Care

"Monograph Review" continued from page 1

congenital heart disease, chronic lung disease, cystic fibrosis, prematurity, immunodeficiency, multiple congenital anomalies, age <6 weeks, and neurologic or metabolic disease.

On the prevention front, the use of RSV immune globin (IG), monoclonal antibodies, and maternal immunization are discussed. High-risk infants appear to benefit when given RSV IG prophylactically. Additional benefit to unborn infants has been noted when pregnant women are immunized with an RSV fusion protein vaccine.

The seasonal visit from RSV continues to be a clinical challenge. Do aerosolized medications work or not, and how can their effect be objectively measured? Can we really administer good aerosol treatments to infants, or are they benign enough to administer empirically? What drug and what dose? For severe bronchiolitics, what is the optimal mode of mechanical ventilation? Will we see our RSV patients in the ER years later with wheezing?

I found this monograph to be quite interesting, particularly with respect to prevalence, treatment, and prevention. It also contains an excellent collection of references on the topics of RSV and childhood asthma. Information about the monograph can be found on the ATS website, www.thoracic.org (select the education section).

Selected references from this monograph:

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Perinatal-Pediatrics Bulletin

is published by the
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Perinatal/Pediatric Specialty Examination Updated

by Barbara G. Wilson, MEd, RRT, president, National Board for Respiratory Care

The Perinatal/Pediatric Respiratory Care Examination, initially administered in March 1991 following several years of planning and national research, was the NBRC's first true specialty examination. After conducting a viability study in 1985 involving specialty practitioners, AARC representatives, and members of the NBRC Board of Trustees, national personnel survey and job analysis research was conducted to establish the admission requirements and content specifications for the new examination. This examination is considered the first "true" specialty examination because it was the first respiratory therapy credentialing examination to assess unique knowledge and skills beyond the entry level (CRTT) or advanced (RRT) credentials.

The job analysis research completed in 1988 identified unique, job-related tasks performed across the country by perinatal/pediatric respiratory care specialists. After two years of item writing and test development, the inaugural administration of the examination took place on March 9, 1991. Approximately

"Specialty Examination" continued on page 3

"Specialty Examination" continued from page 2

1,100 CRTTs and RRTs applied for the first administration of the new examination and 901 respiratory therapists earned the specialty credential in the first year of its existence. To date, the NBRC has credentialed 6,111 Perinatal/Pediatric Respiratory Care Specialists.

Revised examination offered in 1998

The NBRC periodically conducts new job analysis research to ensure that its credentialing examinations reflect current practice. Content of the Perinatal/Pediatric Specialty Examination was revised in 1998 following a second national job analysis of the tasks performed by perinatal/pediatric practitioners. The original 1988 job analysis research identified 273 tasks as appropriate for assessment on the national certifying examination; results of the 1996 job analysis indicated that these specialists now regularly perform 358 tasks. After reviewing this information, the NBRC's Perinatal/Pediatric Respiratory Care Specialty Examination Committee concluded that the number of questions on the revised specialty examination should be increased from 100 to 120. The larger number of questions was needed to adequately assess competency in the expanded scope of practice. The time allowed for completion of the test was increased from two to three hours to compensate for the increased number of test questions.

Although there were minor shifts in the number of questions in the *Clinical Data* and *Equipment* content areas on the revised examination, current content specifications show that the 20 additional items are included in the major content category of *Therapeutic Procedures*. More importantly, the updated examination reflects a shift in the cognitive complexity of test questions. The number of *application* level questions has decreased from 61 to 54, while the number of *analysis* level questions has increased from 20 to 41. Respiratory therapists who attempt the specialty examination can also expect more emphasis on problem solving, evaluation, and judgement than in the previous forms of the examination.

Relatively few tasks were eliminated from the detailed content outline for the revised examination as a result of the recent job analysis. However, an expanded scope of practice and increased technology resulted in many new tasks being included in the content specifications. Table 1 presents examples of some additional tasks now included on the updated examination. There is a complete examination content outline in the examination study guide, which candidates can obtain by calling the NBRC Executive Office or requesting this publication through the NBRC's website (www.nbrc.org).

Table 1: Examples of new content in 1998

I. Clinical Data
- Review results of fetal monitoring
- Review serologic studies (e.g., Rh, ABO, HIV)
- Review neurologic monitoring (e.g., intracranial pressure, EEG, CO2 response)
- Interview patient and/or family
- Determine estimation of lung volumes
- Perform and/or interpret results of bronchoscopy, thoracentesis, polysomnograms, and pneumograms
- Recommend cardiac monitoring
- Recommend echocardiography
- Evaluate nasal swab/washing for RSV

II. Equipment
- Select, assemble, check, identify, and correct malfunctions of bilevel positive airway pressure device, external negative pressure ventilators, extracorporeal membrane oxygenation (ECMO) system, tracheal speaking devices, and hemodynamic monitoring devices

III. Therapeutic Procedures
- Maintain records and explain therapy (IIIA, new content category)
- Perform alternative airway clearance techniques; e.g., PEP®, Flutter® device, Intrapulmonary Percussive Ventilation (IPV®), external percussive devices, autogenic drainage
- Administer exogenous surfactant
- Initiate and/or adjust bilevel positive airway pressure
- Interpret changes in servo pressure during jet ventilation
- Perform capnography
- Initiate and/or adjust high frequency ventilator settings (e.g. amplitude, rate, inspiratory time %, Paw)
- Adjust inspiratory effort (sensitivity) setting
- Use pharmacological agents vasoconstrictors, vasodilators
- Use pharmacological agents exogenous surfactants
- Initiate airway graphic monitoring
- Administer bicarbonate, exogenous surfactant, and cardiac drugs
- Relieve tension pneumothorax
- Act as an assistant to physician performing special procedures, including percutaneous needle biopsies of the lung, polysomnograms, and pneumograms
- Provide instructions for infection control

Minimum Pass Level (MPL) established

Each time revised content specifications for a credentialing examination are introduced a new passing point is set for the updated test. Using the first form of the revised examination, a group of content experts is convened to evaluate the difficulty of each test question; the cumulative judgements of these experts statistically determines the number of correct answers required to pass the examination. Future versions of the test are then equated to the base form to adjust for minor shifts in the difficulty of test forms as new items are introduced.

In 1991, the number of correct answers required to pass the inaugural administration of the Perinatal/Pediatric Specialty Examination was 70 out of 100 (70%). The results of the study to set the MPL on the updated 1998 test determined that successful candidates should correctly answer 83 of the 120 items (69%). Although the percentage of correct answers required to pass the revised examination in 1998 was slightly lower than the original passing point, the success rate for candidates fell slightly.

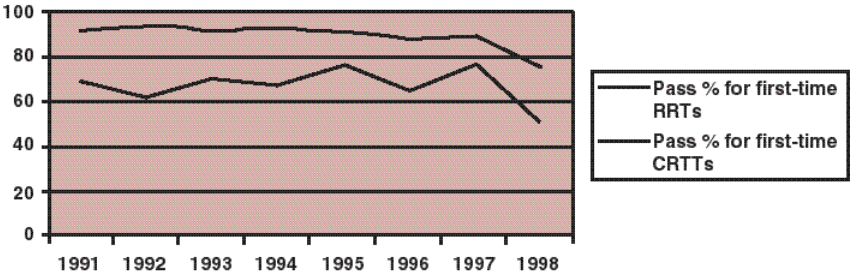
Clearly, no concrete conclusions can be drawn from a single administration of the updated specialty examination.

"Specialty Examination" continued on page 4

Specialty Examination" continued from page 3

However, this slight decrease in pass rate may have been due to the shift in the cognitive level difficulty of test items, or it may reflect changes in the experience level of candidates attempting the specialty examination. In 1991, the average years of experience for an RRTwho earned the specialty credential was 6.7 years; the average years of experience for RRTs who successfully completed the specialty test in 1998 had fallen to 5.3 years. Similarly, candidates who qualified as CRTTs with one year of clinical experience in perinatal/pediatric respiratory care in 1991 averaged 9.7 years of experience; in 1998, the experience for individuals qualifying through this admission provision dropped to an average of approximately 8.5 years. Historical pass/fail information for the examination is presented in Figure 1.

Figure 1: Perinatal/Pediatric Respiratory Care Specialty Examination passing statistics - 1991-1998



Data for Figure 1:

	Pass % for first-time RRTs	*Pass % for first-time CRTTs*
1991	92	69
1992	94	63
1993	92	70
1994	93	68
1995	91	76
1996	88	66
1997	89	76
1998	76	52

Why no acronym?

Perinatal/pediatric specialists have been able to demonstrate their knowledge and skills with respect to this unique patient population and gain recognition of their specialized competence since 1991. Some Perinatal/Pediatric Respiratory Care Specialists continue to ask why the NBRC will not authorize the use of an acronym to denote this professional credential.

The Board of Trustees carefully considered the decision not to offer an acronym when the specialty examination was introduced. It was the belief of the Board, with concurrence by the NBRC leadership, that the specialty credential should not be associated with a designation that might in any way diminish the recognition of the CRTT and RRT credentials or in any way suggest that CRTTs and RRTs were not competent to perform in the perinatal/pediatric setting. Additionally, the NBRC did not want to promote "alphabet soup" within the respiratory care profession and was concerned that future specialty examinations might foster such confusion if multiple acronyms were in use. Finally, since the CRTT and RRT credentials were federally registered trademarks, it was not reasonable to subject them to potential challenge by appending any additional letters to the recognized service marks.

Rather than create an acronym to denote the credential, the NBRC created and registered the Perinatal/Pediatric Respiratory Care Specialist uniform pin and patch. The Board of Trustees continues to believe that such recognition is the most appropriate for specialty credentials beyond the CRTT (soon to be amended to CRT for Certified Respiratory Therapist) and RRT credentials.

Computer based testing

All of the NBRC's examination programs will be transitioned to a computer administration format in 2000, replacing the pencil-paper format of the current examinations. Computer based testing (CBT) offers many new services to potential candidates. The number of opportunities to take the exam will triple for perinatal/pediatric candidates, and examination score reports will be immediately available to candidates. CBT will also allow for flexible scheduling times and locations to better meet the personal and professional needs of candidates.

A sample computer-based examination, using a run-time version of the testing software, will be available on the NBRC's web site and likely included with all NBRC study guides to allow candidates to practice the testing format prior to attempting a credentialing examination. Implementation of CBT for the NBRC's five credentialing examinations will be staggered; the Perinatal/Pediatric Respiratory Care Examination will be administered daily via computer at approximately 80 national locations beginning January 10, 2000.

The Board of Trustees is interested in your comments and questions. We invite correspondence to any Board member or committee in care of the NBRC Executive Office, 8310 Nieman Road, Lenexa, KS 66214, or by phone at (913) 599-4200. You may also access the NBRC through the Internet at www.nbrc.org (NBRC home page address) and nbrc-info@nbrc.org (e-mail address). ■

Perinatal-Pediatric Resource Panel Update

by Peter Betit, RRT

As I alluded in the last issue of the *Bulletin*, some changes have been proposed to the management of our section's Resource Panel. The AARC Board of Directors is in agreement with the proposed changes. In this issue, I am including the excerpts from a memo that is being mailed to all current panel members. The memo is from myself and Mike Czervinske, who manages the Resource Panel.

The memo states the following: The first proposed change is to have perinatal-pediatric resources limit their areas of expertise to two to four areas. This will hopefully provide the section members with three to four true experts in each area. While we may all have a vast array of clinical experiences, it is difficult to be an expert in all facets of perinatal-pediatric respiratory care. When deciding which areas you would like to represent, please give consideration to the areas that most interest you, that you have researched, or that are simply your favorite.

The second proposed change is to have perinatal-pediatric resources submit articles related to their areas of expertise to the *Bulletin*. The goal is to provide section members with information regarding the current issues, trends, or controversies related to these areas of expertise. The articles are intended to be strictly informational pieces, and may be research-based, brief reviews, case studies, or simple anecdotes. The *Bulletin* editor will periodically contact resources and ask for their assistance with these articles.

All section members are invited to participate as resources. Complete the form included in this issue and forward it to Mike Czervinske, RRT, by FAX: (913) 588-4631, e-mail: mczervin@kumc.edu, or mail: Univ. of Kansas Medical Center, Dept. Resp. Care Ed, 3901 Rainbow Blvd., Kansas City, KS 66106-7606.

I would like to thank Mike for his continued efforts in managing the Resource Panel and the current resources for their past and, hopefully, future contributions to the Perinatal-Pediatric Resource Panel.

Perinatal-Pediatric Resource Panel Registration Form

Name _____
Address_____
City_____
State _____ Zip Code _____
Phone _____
FAX _____
E-mail_____
Institution_____

Check one:

_____ I am currently a perinatal-pediatric resource
_____ I would like to be a perinatal-pediatric resource
_____ Please remove my name from the Resource Panel

Please select 4 topics and rate them according to your preference (with No. 1 being the topic you would most like to represent).

_____ Aerosolized Medications: Antibiotics/Antivirals
_____ Aerosolized Bronchodilators: Continuous/Non-dilute
_____ Aerosolized Medications: MDIs
_____ Airway Management: Emergency/Tracheostomy
_____ Asthma: Critical Care Management
_____ Asthma: Education
_____ Asthma: Protocols
_____ Cystic Fibrosis: Non-invasive Clearance of Airway Secretions
_____ Delivery Room Care
_____ Extracorporeal Membrane Oxygenation
_____ High-frequency Ventilation
_____ Home Care/Subacute Care
_____ Inhaled Nitric Oxide
_____ Liquid Ventilation
_____ Management/Staff Education/Quality Improvement
_____ Mechanical Ventilation: Pediatric
_____ Mechanical Ventilation: Newborn
_____ Mechanical Ventilation: Non-invasive
_____ Mixed Gas Administration: Helium-oxygen
_____ Mixed Gas Administration: Hypoxic Gas Mixture
_____ Monitoring Gas Exchange: Non-invasive
_____ Monitoring Gas Exchange: Invasive
_____ Newborn CPAP
_____ Oxygen Delivery
_____ Patient Education/Discharge Planning
_____ Pulmonary Function Testing/Calorimetry
_____ Pulmonary Rehabilitation/Out-patient Care
_____ Sleep Medicine/Apnea Management
_____ Surfactant Replacement
_____ Therapist-driven Protocols/Clinical Pathways
_____ Transport: Inter-hospital ■

Review of CPGs

The AARC Clinical Practice Guidelines Steering Committee would like your help in revising the Clinical Practice Guidelines (CPGs). We need the respiratory community to identify specific areas of the CPGs for revision. Note that the CPGs are evidence based; therefore, please identify areas for revision, provide suggestions for revision, and cite peer-reviewed literature to support those suggestions.

Please e-mail your specific comments to the chair of the Steering Committee, Dean Hess, PhD, RRT, FAARC, at dhess@partners.org or fax them to 617/724-4495.

You will find copies of all the CPGs published by the AARC at: http://www.rcjournal.com/online resources/cpgs/cpg index.html

FYI . . .

Valved holding chamber found effective

Attaching a valved holding chamber to an MDI can alleviate the coordination problems involved in delivering aerosolized medications to children and infants, say Canadian researchers who compared four different devices.

The study looked at the efficacy of the AeroChamber, OptiChamber, Space Chamber, and E-Z Spacer in the delivery of salbutamol and beclomethasone. Researchers attached the devices to the replicas of the faces of a seven-month old infant, two-year old toddler, and four-year-old child, then simulated appropriate tidal breathing patterns. They found that the amount of inhaled fine particles differed significantly depending on the device used and the age of the child. But overall, the AeroChamber and OptiChamber delivered more fine particles than the other devices. The age-related variations found with these two devices were also insignificant. (Chest 1009:114:1676-1680)

Hospitalization may not be necessary

University of Rochester investigators who studied the records of 2,028 pediatric patients hospitalized for asthma over a five year period found that just 27.1% had oxygen saturations that fell below 90% after hospitalization and only three deteriorated to the point where they had to be transferred to critical care.

In 51.6% of the patients, oxygen saturation remained between 90% and 94% after they were admitted to the hospital and in 21.3% it stayed at 95% or greater. What's more, although these patients received frequent nebulized medication for only about 16 hours, the average hospital stay was 2.5 days.

The researchers conclude that more than 70% of the children in this study did not need to be hospitalized. Instead, they could have received appropriate treatment – supplemental oxygen, nebulized medication, and close nursing supervision — in short-stay, day care, or other centers. (Arch Pediatr Adolesc Med 1999;153:49-55)

PVC flooring a problem for infants with bronchial obstruction

PVC flooring – but not PVC wall covering – has been linked to childhood asthma by researchers from Norway.

Spurred by studies indicating that a polyvinyl chloride (PVC) ingredient can cause bronchial hypersensitivity in rats and that premature infants with long-term contact with PVC breathing tubes have higher risks for asthma, they compared the living environments of 251 healthy infants and toddlers with 251 diagnosed with bronchial obstruction. The children in the bronchial obstruction group were more likely to live in homes with PVC flooring, and children living in these homes had an 89% higher risk of bronchial obstruction.

Researchers believe PVC flooring may cause problems when PVC wall coverings do not simply because infants toddlers come in closer contact with the floors of their homes than they do with the walls. (American Journal of Public Health 1999;89:188-192)

Atopic eczema affects more kids than believed

New Zealand researchers who studied the prevalence of atopic eczema in 56 countries found that the condition affects between five and 20 percent of children ages six, seven, 13, and 14, a higher rate than previously believed.

The group arrived at these findings through a cross-sectional questionnaire conducted among random samples of children. Those with a positive response to questions relating to the presence of an itchy, relapsing skin rash in the last 12 months that had affected their skin creases were considered to have atopic eczema. Children whose dermatologic symptoms resulted in sleep disturbance for one or more nights were considered to have severe atopic eczema.

Highest prevalence values were found in urban Africa, the Baltics, Australia, and Northern and Western Europe. Lowest prevalence values were present in China, Eastern Europe, and Central Asia. Researchers believe these results suggest an environmental link to the disease and dispel the idea that atopic eczema presents itself mainly in developed countries with cool climates. (J Allergy Clin Immunolo 1999;103: 125-138)

High school athletes should be tested for EIB

Temple University researchers who found that 9 percent of 214 high school football players suffered from exercise-induced bronchospasm (EIB) after running one mile believe that athletes – particularly those in poverty areas – should be actively screened for EIB in order to identify and treat possible asthma.

The study involved 238 varsity male high school athletes, 16 to 17 years old, from five public and four parochial schools in Philadelphia. Ninety were European-American, 139 African-American, and 5 Hispanic. Twenty-four of the athletes reported a history of asthma treatment and were excluded from data analysis. The tests took place in the afternoon from mid-August to early November during 12 different football training sessions.

To indicate bronchial constriction, the researchers used a 15 percent drop in each athlete's peak expiratory flow (PEF) rate at 5, 15, or 30 minutes after the one-mile run. The African American athletes had a much higher rate of EIB than the other groups, with 17 of the 19 teenagers who had positive tests falling into that racial category.

To validate the test, investigators took 15 volunteers who tested positive for EIB and gave them a second one-mile run. Twenty-five minutes prior to the test, eight of the athletes took three puffs from an albuterol inhaler while the other seven puffed on a placebo inhaler. After the run, the placebo group had a 14 percent drop in their PEF rate, while the bronchodilator-treated teenagers had a six percent increase. (CHEST, 12/98) ■