Diagnostics Bulletin

July/August '98

American Association for Respiratory Care

Notes from the Chair

by Carl Mottram, RRT, RPFT

Youth has visions of the future which are not shared to an equal extent by those of middle and later age; youth is a builder of images, a dreamer of dreams.
— W.J. Mayo

Pediatric diagnostic testing is a challenging and often rewarding faction of our specialty section. Patients can range from the young adult to the smallest of infants, and the challenges they present can be formidable. What I find most enjoyable is taking away the fears and anxieties of a young person, making him or her feel safe and comfortable. This is often the best method of eliciting their best effort and performance during a test or procedure as well. The key is remembering that they are not just small adults. They come with differences in behavior, responses, and procedural methodologies. In order to help all of us better care for this portion of our patient population, we are devoting this issue of the *Bulletin* to issues related to pediatric testing.

I would also like to take this opportunity to encourage you to provide us with your feedback on the new format of the *Bulletin* and whether or not you feel we are meeting your needs in providing timely and informative information related to our section. I would also like to invite anyone interested in contributing to the *Bulletin* to either give me a call or contact one of our *Bulletin* editors. This contribution can be in the form of an idea, an informational note (FYI), or an article. We would love to have input from more of our members. ■

Notes from the Medical Director

by Peter A. Southorn, MD

Across this nation, neonatal intensive care units are at the forefront of hospital areas implementing point of care (POC) blood testing. Respiratory therapists, by virtue of their traditional role in delivering care at the patient's bedside, are in a unique position to assume responsibility for performing these tests.

Why does POC testing make sense in the neonatal ICU? The sometimes remote location of the neonatal unit from the other ICUs and the inefficiency that this produces make the cost of running a dedicated STAT lab for the NICU prohibitively expensive in terms of labor costs and equipment. But having lab technologists obtain specimens at specific times of the day is obviously not a satisfactory substitute. Specimens may be obtained at inappropriate times and often disturb the babies by not being in sync with their nursing care or their sleep patterns.

POC speeds up test turnaround time; this is important in assessing the results of a therapeutic intervention or monitoring a change in the baby's condition. The blood sample volume needed to perform such POC tests is also less than with the traditional STAT lab equipment. This is important in reducing iatrogenic blood loss and the need for transfusion in small neonates. Some studies have found that there are also a reduced number of heel sticks required when monitoring babies using POC, a fact that will further reduce iatrogenic blood loss.

The introduction of such POC bedside testing, however, can set off an emotional turf battle. Avoiding such infighting among staff requires the leadership of a designated laboratory director. Discussion, good communication, and competency, along with

"Notes" continued on page 2

"Notes" continued from page 1

knowing how to use the equipment, obtain blood specimens, and perform the necessary electronic quality controls are essential skills. Documenting the results in the laboratory information system and quality control oversight from the central laboratory are important as well.

Respiratory therapists are in a unique position to undertake this new responsibility. POC in the neonatal unit appears to be an important clinical advance. Furthermore, I am sure that if babies could but speak they would approve it in terms of their patient satisfaction. ■

Diagnostics Bulletin

is published by the
American Association for Respiratory Car e
11030 Ables Lane
Dallas, TX 75229-4593
(972) 243-2272
FAX (972) 484-2720
e-mail: info@aarc.org

Kelli Hagen
AARC communications coordinator

Debbie Bunch
Bulletin managing editor

Edwards Printing
Bulletin typesetting

Section Chair
Carl Mottram, RR T, RPFT
Mayo Clinic, Pulm. Function Laboratory
South-3 Plummer
First Street SW
Rochester, MN 55905
(507) 284-6811
FAX (507) 284-1462
e-mail: CMOTTRAM@MAYO.EDU

Chair-elect
Catherine M. Foss, BS, RR T, RPFT
(313) 936-5250
FAX (313) 763-2059
e-mail: cfoss@umich.edu

Medical Advisors
Peter Southorn, MD
(507) 284-9695
FAX (507) 284-0120

Bulletin Editors
Vickie Ganey, MBA, RR T, RPFT, RN
Halifax Regional Hospital
2204 Wilborn Ave.
South Boston, VA 24592
(804) 575-3166
FAX (804) 575-3848
e-mail: Vickie.Ganey@HalifaxRegional.com

Mary Kay Collins, RR T, RPFT
Doctor's Klock and Whitehouse PS
(509) 755-5864
(509) 755-5869 FAX
e-mail: jcollins@ieway.com

Validation of Pediatric Spirometry in Asthma Diagnosis and Management: Strategies for Optimizing Patient Test Results

by Jim Norton, RRT, RPFT, diagnostic therapist, respiratory care department, Medical College of Virginia, Richmond, VA

The 1997 update of the National Institutes of Health's Guidelines for the Diagnosis and Management of Asthma recommends that office-based physicians caring for asthmatic patients have access to spirometry for diagnostic purposes and specifically stresses that peak flow meters are meant to be an asthma monitoring tool only. I found this recommendation to be very encouraging, as I have been on somewhat of a mini-crusade to persuade many health professionals in our institution of this point for some time.

Peak flow meters are fast, simple, and capable of reproducible measurements. However, their diagnostic utility is limited due to effort dependency issues and the wide variability in even the best published peak expiratory flow reference values. (3)

Clearly, spirometry is necessary for accurate diagnosis. The problem lies in the fact that even though there is no question about the diagnostic benefits of spirometry in pediatrics, quality data can be frustratingly difficult to obtain due to the limited attention span of many children. Furthermore, the NIH Expert Panel recommends that spirometry be performed using equipment and techniques that meet standards developed by the American Thoracic Society (ATS) — a lofty goal where children are concerned.

The NIH asthma guidelines acknowledge the difficulty of obtaining quality spirometry data from children. The Expert Panel does recommend that if questions arise about test quality, accuracy, or interpretation, children should be tested in pulmonary function laboratories that specialize in testing children in order to acquire higher pulmonary function values. However, referral to a pediatric pulmonary laboratory may not always be practical or necessary. With the availability of inexpensive and improved computerized spirometers, many physicians can take advantage of the diagnostic benefits of spirometry.

I believe my institution has come up with some practical strategies for obtaining accurate spirometry data in children that go beyond those typically used. Telling a child to pretend that he or she is blowing out candles is a useful analogy, but frequently it is not enough to teach the art of spirometry to a child. I would like to share our approach in the hopes of lessening the anxiety among those of you who are intimidated by the testing of children.

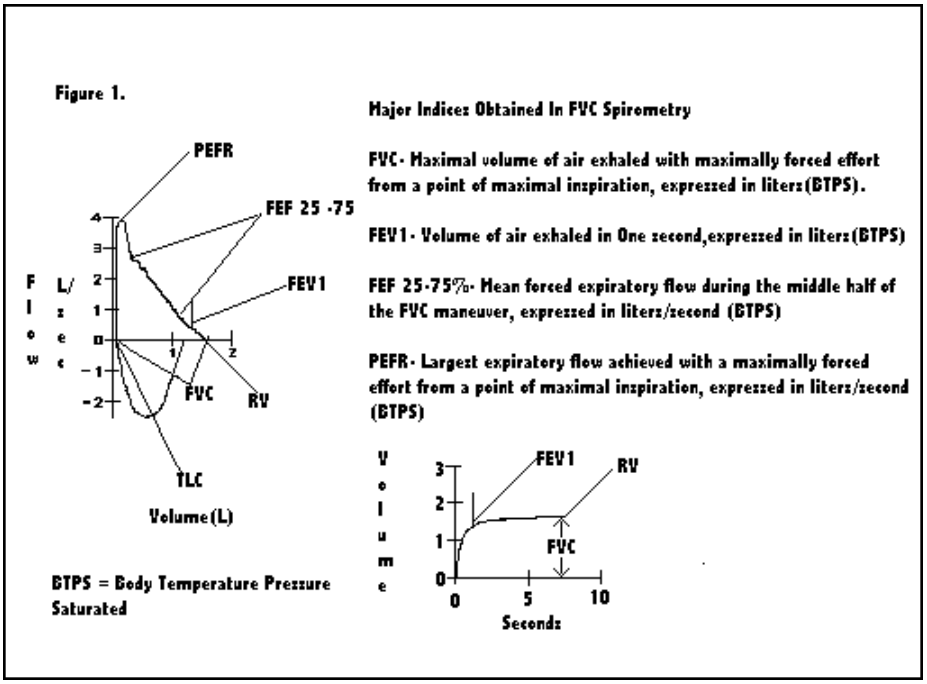
Our approach requires the use of a spirometry system with the ability to provide real-time graphic and tabular results. As mentioned earlier, these systems are readily available. We start around the age of four years, but the generally-accepted age for spirometry success is around six years of age. Just as the NIH Expert Panel recommends, we utilize ATS spirometry guidelines when testing all of our patients. Indeed, no spirometry discussion can be conducted without a review of the ATS Spirometry Standardization Statement:

"Test Results" continued on page 3

"Test Results" continued from page 2

Acceptability Criteria: (2), (4)

1. Good start of test; back extrapolated volume should be less than 5% of the FVC or less than 0.15 L, whichever is greater.
2. No hesitation or coughing, especially during the first second.
3. FVC lasts at least 6 seconds and there is a plateau of at least 1 second; or there is an obvious plateau of reasonable duration; or the subject cannot continue to exhale further.
4. There is no Valsalva or glottic closure maneuver or obstruction of the mouthpiece by the tongue or teeth. There is no leak or early termination of effort.
5. The FIVC maneuver, if obtained, should show apparent maximal effort.



Reproducibility Criteria:

1. The largest and second largest FVC values should be within 200 ml.
2. The largest and second largest FEV1 values should be within 200ml.
3. Peak expiratory flow maneuvers are variable. Although they may be used for gauging subject effort, no specific reproducibility criteria are recommended.
4. If three acceptable tests are obtained and the FVC and FEV1 reproducibility criteria have been met, no further testing is necessary. If reproducibility criteria are not met, testing should continue until eight attempts have been recorded or the patient cannot or should not continue.

The primary variables for assessing reproducibility are the FVC and FEV1. (4) Figure 1 illustrates the major FVC spirometry indices and correlates them to their measurement points on the flow-volume and volume-time graph tracings. These criteria reflect 1994 ATS spirometry guidelines and are a change from the previous criteria, which recommended that the FVC and FEV1 be within 5% or 100 ml, whichever was greater. (4)

The 1996 AARC Spirometry Clinical Practice Guideline suggests that 5% or 100 ml might still be acceptable. (1) Gregg Ruppel, RRT, RPFT, suggests that either of these criteria be considered as goals to be achieved or exceeded. His opinion is that the 200ml standard simplifies calculations and reduces bias due to body size of the patient. (4) Additionally, Ruppel feels that either set of criteria should make little difference in the interpretation of spirometry data. (4) Our pulmonary function software utilizes the pre-1994 ATS criteria, and we continue to test using that criteria.

In consideration of ATS guidelines, we have developed the following procedures for obtaining spirometry data from children:

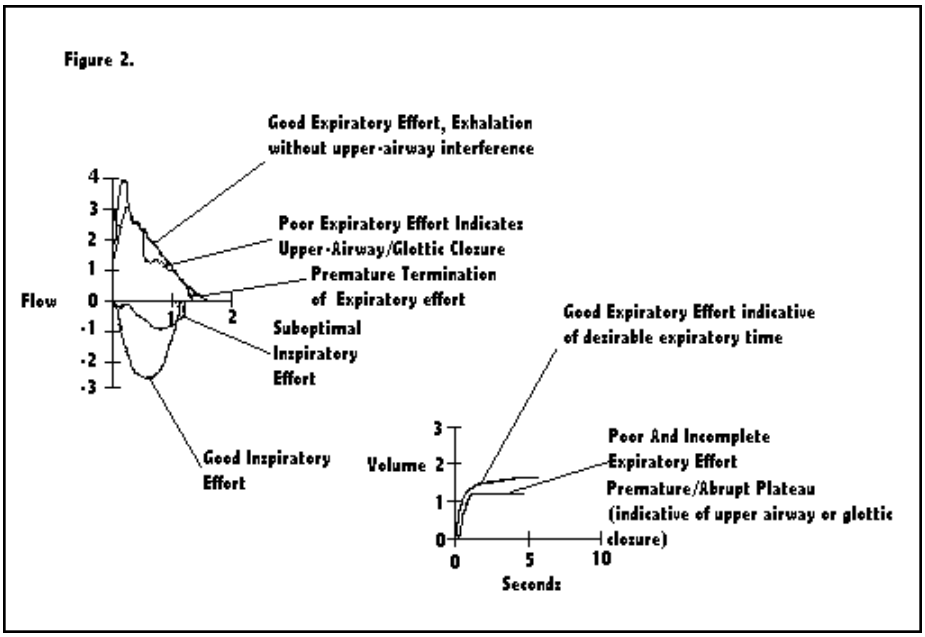
1. Insure the pulmonary function system is calibrated to current ambient atmospheric conditions, especially the room temperature.
2. Explain the test to the child, reassuring him that the test is not painful, but that you need his help and best effort to get the best results. It can be useful, and even necessary, to personally perform the FVC effort for the child.
3. Attempt to maintain eye contact with the child as much as possible. A child's willingness or lack thereof to make eye contact can be an indication of his ability to focus on instructions and your potential success in obtaining useful data.
4. Keep the instructions as simple as possible; avoid talking down to the child.
5. Have the child stand up and keep his head as erect as possible.
6. Use noseclips, if possible. (I've found that many children are quite sensitive about their noses and they will focus on the discomfort of noseclips, which can make it difficult to get good cooperation. So I don't fight with the child to keep them on.)
7. Make sure that the patient keeps the mouthpiece centered in his mouth. You may have to hold the mouthpiece in the patient's mouth yourself to keep it centered in the mouth and over the tongue. Closely observe how the patient maintains the mouthpiece seal and position in order to help avoid upper airway closure or obstruction.
8. Instruct the child to take in the deepest breath he can and to blow out as hard, as fast, and as long as he can. It is desirable to obtain at least six second expirations. But you may be lucky to get three second expiratory efforts, which many times is enough to assess the presence of small airway disease. Plus, small children can potentially exhale their FVC in less than six seconds. (4)
9. If the system software has the

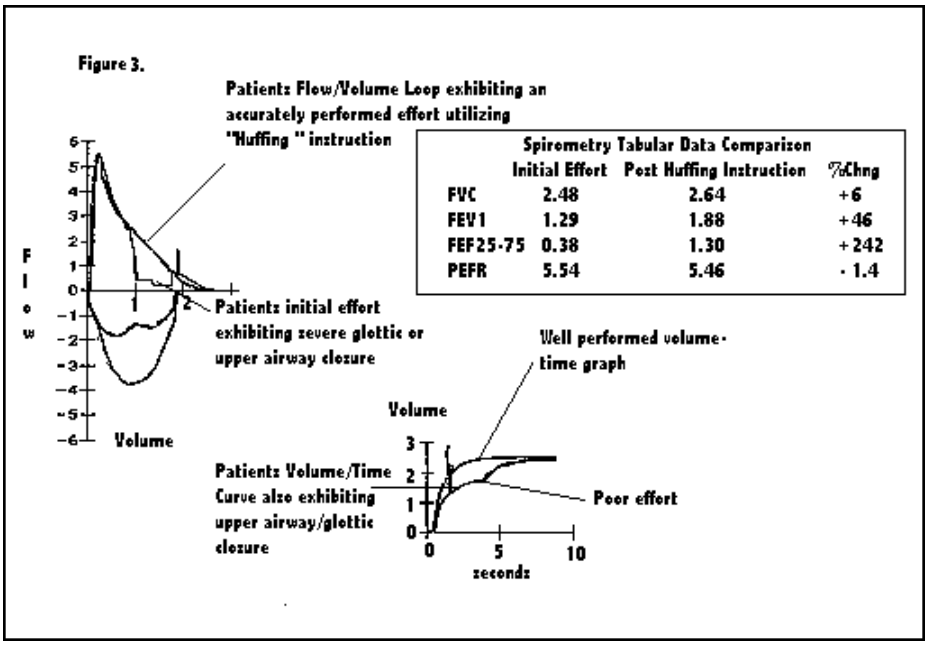
"Test Results" continued on page 4

"Test Results" continued from page 3

capability, observe the inspiratory flow signal during the initiation of a patient's inspiratory effort to insure that the patient's inspiratory flow tracing completely returns to the X or volume axis opposite the point of the initiation of their inspiratory effort. Incomplete inhalation can be identified by a partially curvi-linear inspiratory flow tracing that abruptly transitions to a mostly straight and vertical flow signal coming back to the X axis. Insuring that the child is inhaling to total lung capacity as closely as possible will improve the accuracy of the FVC maneuver data. (See Figure 2 for a comparison of optimal versus sub-optimal efforts.)

10. Have the child perform one to three practice efforts to assess his grasp of your instructions. Analyze each effort for evidence of test artifact. Most children will need practice efforts. Although ATS criteria recommends only performing a total of eight efforts, I feel that standard may not be appropriate with children. A child may have to perform five to nine additional efforts beyond the initial practice efforts to obtain data consistency and overcome testing artifact. My personal cut-off has become approximately 12 efforts during a baseline assessment of child less than ten years old, especially if I can't get longer than two second expiratory times out of the child. After ten years of age, I generally use the eight total efforts rule.





My impression is that there are two major spirometry artifacts affecting a pediatric patient's data quality that need to be overcome. The first, as mentioned previously, is glottic or upper-airway closure. Our medical director prefers that we use the term "upper-airway closure," as a tester is not always positive about what is causing the expiratory flow impediment. I suggest the following strategy for identifying glottic closure.

During patient efforts, listen closely for any "grunting" sounds from the patient that can be indicative of, and correlated with, the graphic tracings as upper-airway closure. This can be identified by a "cliff like" pattern in the mid to terminal phase of the flow-volume loop that causes an abrupt and non-linear expiratory flow signal (again refer to Figure 2). In addition, the volume-time graph will present with a premature and abrupt plateau of the expiratory flow signal, indicative of glottic or upper-airway closure. It can helpful to use a stethoscope to identify when the child is performing glottic closure. I've had children wear the stethoscope so they could realize when they were causing the artifact. Then I concentrate on getting them to relax their upper airway or, as I tell them, "their throat muscles."

The second goal is teaching the child the art of prolonged expiration. If the child demonstrates an inability to exhale in a prolonged manner during the first several efforts, I begin to teach the child what is referred to as "huffing." This is a technique for teaching the child how to utilize his diaphragm during the latter phase of expiration for the purpose of producing prolonged and complete expiration to residual volume. It is a modification of the controlled breathing and coughing technique used in autogenic drainage, a pulmonary secretion clearance technique used in cystic fibrosis patients. It also appears to help many of my patients relax their upper-airway and overcome glottic or

"Test Results" continued on page 5

"Testing Results" continued from page 4

upper-airway closure artifact.

The analogy I make for my patients is that of "making steam" on their parent's car window or the bathroom window at home. I also have children place one hand and forearm gently across their abdomen and instruct them to give themselves a gentle hug during the latter phase of exhalation. (Figure 3 is an example of a patient's initial efforts compared to his efforts after teaching him how to utilize his diaphragm and coaching him closely to avoid upper airway closure with the huffing technique.)

Children and their parents usually find the comparison amusing, and it works well much of the time. As the child catches on, I increase the intensity of my coaching to obtain maximal data. Additional teaching aids consist of having the tester hold a tissue approximately 12 inches from his mouth and making the tissue move, thus demonstrating a huffing maneuver, followed by having the child demonstrate his ability to do the same. Party favors may be useful, but I do not recommend "kazoos," as they appear to reinforce glottic or upper-airway closure maneuvers. We also no longer use balloons due to the choking hazard they present.

An additional tactic that we use to insure that the child exhales as closely as possible to residual volume is counter to what is done in many pulmonary labs. As it is difficult enough to obtain optimal expiratory efforts from children, we do not attempt to coach the child to inhale maximally after an FVC effort at what the tester may perceive as end exhalation. This helps to insure that the patient's data will represent a more accurate FEV1 to FVC ratio, as well as improves the accuracy of other expiratory flow and volume indices. Instead, we concentrate on getting the patient to inhale maximally before he performs the FVC maneuver.

After testing is completed, it is time to select the best efforts for reporting purposes. In our pulmonary lab, our medical director requires that we select the single best effort with concurrent tabular and graphic data after assessing all the data for reporting purposes using ATS criteria. Due to computer data storage considerations, we only maintain the "raw" data on our patient tests (in case our physicians want to review a patient's overall results) for one week. The data is backed up weekly to a peripheral data back up system. Many pulmonary labs' systems have software packages that integrate data from the best two or three efforts for reporting purposes, which is permissible under ATS criteria. When making test comments, one must be sure to indicate any testing artifact produced in accordance with ATS criteria, as well as the patient's level of cooperation. If they don't meet ATS criteria, indicate how many efforts the patient attempted.

This article is not comprehensive. Anyone performing spirometry should take time to conduct a complete review of spirometry techniques, test interpretation skills, and methodology. There are many excellent resources available. Susan Blonshine, RRT, RPFT, has published a manual on spirometry quality. In addition to Ms. Blonshine's text, there are other must-have pulmonary function manuals by Greg Ruppell and Jack Wanger, RRT, RPFT.

If you're looking for some formal training, the NIH suggests attending spirometry courses offered by the Occupational Safety and Health Administration (Call 1-800-35NIOSH). The Medical Graphics Corporation sponsors several pulmonary function seminars a year, with lectures by the aforementioned authors, among others. If possible, locate a pediatric pulmonary function lab nearby and request a visit to get a better feel for what it takes to be successful when working with children.

Lastly, obtain a copy of the NIH Expert Panel Report 2, Guidelines for the Diagnosis and Management of Asthma. It is an excellent document and is available to all AARC members via AARC Online (http://www.aarc.org — click on "Professional Resources"), from the NIH Internet site (http://www.nih.gov), as well from several respiratory care-oriented pharmaceutical companies, such as KEY pharmaceuticals. It offers a logical, systematic approach to asthma therapy that explains fully how spirometry and peak flow monitoring are to be used in a complimentary manner.

Finally, I can't emphasize enough the importance of using patience and enthusiasm when working with children. It often takes significant energy to motivate children to provide the data you need to help them. Successful pediatric spirometry is possible—and at least for me—very rewarding. ■

References

1. American Association for Respiratory Care: Clinical Practice Guideline: Spirometry, 1996 Update, Respiratory Care 41:629-636, 1996
2. American Thoracic Society: Standardization of Spirometry: 1994 Update Am J Respir Crit Care Med 152:1107-1136, 1995
3. National Institute of Health, Guidelines for the Diagnosis and Management of Asthma: Expert Panel Report 2: Clinical Practice Guidelines: NIH Pub NO 97-4051: 6-58,1997
4. Ruppel, Gregg L.:Respiratory Care Clinics of North America, Pulmonary Function Testing: Trends and Techniques: Spirometry: Vol 3 NO 2: 155-181,1997

What Do You Do When Asked to Do the Near Impossible?

by Vickie Ganey, MBA,RRT, RPFT, RN

Anyone who has worked in the field of respiratory care for more than a year has probably come across patients who just can't seem to understand anything you are trying to tell them.

And then there are the children!

We have all learned to do the impossible (and to do it well) when dealing with adult patients. But for those of us who only occasionally do a pediatric PFT, it's still a real learning opportunity for both the patient and the technician every time a youngster enters the lab.

"What do you do?" continued on page 6

"What do you do?" continued from page 5

Like most of you, I find that pediatric patients pose special problems when doing pulmonary function tests. The obvious one is of size—most of us have everything set up for the adult, so nothing fits the "little" people. Then we have the problem of relating to them what we want them to do correctly and with great (good) effort and understanding.

In talking to many different respiratory practitioners during the past three months, I have found that we all share the same problems. What was really great, however, was hearing how these problems have been solved. Most of the people I consulted have been able to find ways to deal with the technical side of things without a whole lot of trouble. But the really great information lies in how they have been able to actually ensure that the test is completed.

I know that when I'm working with a pediatric patient, success or failure really depends on the individual child and my ability to gear my explanations to his or her individual needs. Sometimes I can show them and sometimes all I have to do is tell them. Many times I find that if I can relate what I want them to do to something they have seen or heard they can accomplish the task. Most of the time, if I make a big enough "idiot" of myself I can find a way to get the test done. (It's all in the "acting.")

One of the best stories I heard was from a therapist who had her young daughter come in during a pediatric PFT and sit next to the patient and do everything the patient was asked to do. This way the patient could actually see how to do the procedure as it was explained.

I have long believed that when in doubt, call and ask someone who knows. There are many more pediatric PFT labs and PFT labs that deal with pediatric patients than there used to be, as well as more people who work with pediatric patients in general. So if you are having problems with a pediatric patient and you can't send the patient to a pediatric PFT lab, call someone at such a lab and ask for help. I have always found that it is better to ask directions when I'm lost than it is to drive around until I run out of gas!

So what do you do when asked to do the near impossible? Use the resources available to you. There are people out there who know how to get the job done—it's better to stop and ask than it is to wear out your patient and your patience. ■

Know Your Numbers: NLHEP Set to Revolutionize Diagnosis of Lung Disease

All AARC members recently received a copy, via publication in the March issue of RESPIRATORY CARE, of the National Lung Health Education Program's (NLHEP) resource document calling for greater use of spirometry to diagnosis COPD in physicians' offices. The program's chief aim: to make spirometry as routine in the physician's office as blood pressure checks are today.

"We are hoping that the program will grow the same way that cholesterol screening and blood pressure checks have grown," says Ray Masferrer, RRT, associate executive director of the AARC and the Association's representative on the NLHEP executive committee. In addition to the AARC, the program is being sponsored by the American Association for Cardiovascular and Pulmonary Rehabilitation, the American College of Chest Physicians, the American Thoracic Society, the American College of Physicians, and the Society of General Internal Medicine. Government sponsors include the Lung Division of the National Heart, Lung, and Blood Institute, the National Cancer Institute, and the National Institute of Occupational Safety and Health. By joining forces through the NLHEP, these organizations believe they can revolutionize the diagnosis of COPD and other smoking-related illnesses.

Based on findings from the Lung Health Study — which noted that spirometry could effectively predict not only COPD but early death from all causes—the NLHEP is directed to all primary care professionals, respiratory care practitioners included. The objective is to reach all smokers and patients with common respiratory symptoms of dyspnea, cough, sputum, and wheeze by putting spirometers in the hands of all primary health providers and promoting their use. The program's theme — "test your lungs/know your numbers" — will attempt to convince patients that knowing their FEV1 and FVC is just as important as knowing what their blood pressure is or knowing their cholesterol levels.

At least three companies have developed spirometry devices so far capable of meeting the needs of the primary care physician. These devices give direct readout of FEV1, FVC, and the ratio between the two, along with the option of printing out volume-time and flow-volume curves. All meet American Thoracic Society standards.

"We needed devices that were inexpensive and easy to use," says Masferrer, "and companies have come up with those devices." The next step is to develop a Spirometry Statement that will help guide primary care physicians in the appropriate use of the test. He and the other members of the executive committee, says Masferrer, are currently working on such a statement and they hope to have a final version ready soon. "The NHLEP process," he says, "has been one of coming up with ways to facilitate the use of spirometry in physicians' offices."

What will the wide spread use of simple spirometers in primary care practitioners'offices mean to respiratory care practitioners? "RCPs will be called upon to actively participate in screening efforts," says Masferrer. As the only allied health practitioners with specific knowledge and training in spirometry, hospitals and doctors' offices alike will also look to RCPs to assist in training primary care practitioners — physicians and nurses Ñ in the proper use and interpretation of spirometry.

Finding patients early in the course of their disease will create more treatment opportunities for practitioners in the profession as well. "One of the biggest benefits for respiratory care," continues Masferrer, "is that the pro-

"Pulmonary Function" continued on page 7

"Pulmonary Function" continued from page 6

gram will identify more people with lung disease earlier on. So we will not only be part of the screening, we will also be involved with therapeutics — treating people with early disease to help them avoid major problems later on."

He also believes the program will encourage managed care companies to increase their investment in smoking cessation programs and other efforts aimed at prevention and wellness in this patient population. RCPs can play a role in these efforts as well, by lending their expertise in the diagnosis, treatment, and prevention of respiratory disease to companies who want to set up large scale screening and intervention programs for their enrollees. ■

Writers Wanted!

by Vickie Ganey, MBA, RRT, RPFT, RN, and Mary Kay Collins, RRT, RPFT

Many of you reading this article could sit down right now and write about something that many other RCPs would find of interest. Unfortunately, most of you don't believe it, and that's why you don't do it. This article is for you!

Everyone working in the profession has seen or done something that would be of interest to another respiratory care practitioner in a similar situation. It doesn't have to be a research article or any type of study. It can be about a better way you found to do a procedure or an interesting way of doing or getting something done. It can be about how to deal with patients or about how to work with staff.

As co-editors of the *Bulletin*, we need your help in providing information to section members via the *Bulletin*. If you have an idea that you would like to share, a way of getting a procedure done, or a humorous happening, write about it. You can contact us at the addresses/numbers listed on page two of this and every issue. ■

The AARC and UCSD Offer Patient Driven Protocols Manual

The AARC is proud to partner with the University of California San Diego (UCSD) in offering the university's Patient Driven Protocols Manual. UCSD's Respiratory Services developed the manual to serve as a resource for respiratory care providers in developing, implementing, or refining care plans which are implemented by bedside practitioners based on patient evaluations and responsive interventions.

The original protocol program was developed at UCSD in 1993 and has expanded from 2 protocols to more than 25. Each of them has been successfully implemented at UCSD as part of a hospital-wide program. In fact, the manual serves as a daily reference for respiratory therapists, physicians, nurses, and other medical staff at the university's hospital.

This protocol manual includes guidelines for oxygen, secretion management, percussionaire, autogenic drainage, extubation, and post-op laparotomy.

Cost of the manual (product # PA801) is $85 for members and $99 for nonmembers. Shipping cost is $10. For more information or to order, contact the AARC at (972)243-2272.

Outstanding Section Member of the Quarter: *Request for Nominations*

Don't forget to make your nominations for the Diagnostics Outstanding Section Member of the Quarter award. The winner of each Outstanding Section Member of the Quarter award will be featured in an article in the Bulletin and our Specialty Practitioner of the Year will be chosen from these four winners. The winner of the Specialty Practitioner of the Year award will be honored during the Awards Ceremony at the AARC Convention.

The recipient of this award will be determined by the section chair or a selection committee appointed by the chair. Each nominee must be a member of the AARC and a member of the section.

Mail or FAX a short (500 words or less) essay outlining your nominee's qualifications for the award to the Section Chair at the address/number listed on page 2 of this issue. Be sure to include your name, address, and phone number, along with that of your nominee.

Resource Panel Update

An updated version of our Resource Panel will be mailed soon and we are still looking for additional qualified members to add to the list. If you would like to participate in the panel, fill out the form below (we ask that you limit yourselves to ten topics or less) and return it to one of the Bulletin editors at the addresses listed on page 2 of this issue. ■

___New Panel Member ___Returning Panel Member w/Changes

___Please drop my name from the panel

Name: _____

Title: _____

Institution: _____

Complete address(es) (work and/or home) _____

_____

_____

_____

_____

Phone(s): _____

Fax: _____

E-mail (if available): _____

TOPICS: *Resource Diagnostics*

___ Spirometry

___ Lung volumes

___ Airway Mechanics

___ Diffusing Capacity

___ Steady State Diffusing Capacity

___ Blood Gas, Electrolyte and Hemoximetry Analysis

___ Point of Care Testing

___ Bronchoscopy

___ Sweat Chloride Testing

___ Conscious Sedation

___ Cardiopulmonary Exercise Testing

___ Airways Challenge Testing

___ Pulmonary Mechanics and Occluding Pressures

___ Sleep Disorders

___ High Altitude Simulation

___ Ventilatory Drive

Critical Care Pulmonary Diagnostics

___ Indirect Calorimetry

___ Noninvasive Cardiac Diagnostics

Pediatric and Neonatal Care

___ Neonatal, Infant, Toddler, and Pediatric Pulmonary Diagnostics

___ Pediatric Bronchoscopy

___ **Research**

___ **Occupational Health**

___ **Administrative Management**

___ **Rehabilitation & Education**

___ **Patient Focused Protocols**

___ **Clinical Practice Guidelines**