



Education

Issue No. 2

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Notes from the Guest Editors:

Education And Training Perspective

by *Oliver J. Drumheller, EdD, RRT, senior medical education specialist for Respirionics, Inc., Pittsburgh, PA, and chair of the AARC Subcommittee on Multiskilling*

Corporate education and training is important in today's competitive and rapidly changing work environment, and there may be a parallel for respiratory care educators as their products — program graduates — prepare for the marketplace. A summary of recent topics in this area should be helpful to those of us responsible for dealing with clinical education and affiliates.

Corporate education and training involves designing curricula, training, and organizational interventions to meet changing business demands. While there are several paradigms found within organizations today, three are emerging that deserve attention. "Energy/Chaos" models emphasize interconnectivity between workers and across levels to meet work needs. Teams form, disband, and reform as needed. "Incremental" or "Developmental" models create a partnership between the learner (worker) and the organization. Coaching by supervisors and peers builds trust among workers. "Virtual" organizations depend on the newer communication pathways, such as e-mail, voice mail, and fax, to get the job done. Team members may never meet in person, but continually dialogue to conduct "cyber" business (Shaffer, 1997).

The "Learning Organization" concept begun by Peter Senge, and discussed by Stamps, promotes an environment where teaching and learning become embedded within the organization. A rich interplay

develops between formal training by the trainers and informal training between workers upon their return to work. Three interesting findings have been advanced. First, for every one hour of formal training there is a four hour "spill over" in informal training. Second, the vast majority of corporate knowledge consists of information shared or created in face-to-face conversations among workers. Third, stimulating positive relationships between workers is essential for corporate success (Stamps, 1998).

The health care industry's needs are changing, especially in subacute care, and the result has been a reorganization of service delivery. Three of the four models for service delivery ("Unidisciplinary," "Multi-disciplinary," "Interdisciplinary") are primarily discipline-specific. But the fourth, and perhaps most advanced — "Transdisciplinary" — focuses across and between disciplines, and targets skills necessary for successful discharge planning prior to, and at, admission. Key elements include team-oriented teaching and communications, broad problem-solving skills, and quality patient outcomes (Meyers, 1997).

Are these topics familiar or apparent in your clinical settings? A brief view into the world of corporate education and training can provide respiratory care educators with a different perspective. Seize the opportunity to interact with your health care training colleagues. ■

References

- Shaffer, R. The challenge of educating future workers, *Futures Research Quarterly*, Fall, 1997.
- Stamps, D. *Learning Ecologies, Training*, January, 1998.
- Meyers, S. *Transdisciplinary Teams, Subacute Care Today*, November/December, 1997.

1998 Calendar Deadlines

- Fall Open Forum Abstracts (Final)
May 27
- AARC Summer Forum (Naples, FL)
July 17-19
- December 5 RRT Exam
August 1
- November 14, 1998 CRTExam
September 1
- December 5 RPFExam
September 1
- International Respiratory Congress (Atlanta)
November 7-10
- Respiratory Care Education Annual Paper
December 1

Transition From Respiratory Care Practitioner To Clinical Education Coordinator

by Gudrun Pryor, BS, RRT, clinical education coordinator of respiratory therapy at Washburn University of Topeka, Topeka, KS

Challenging. This is the answer that I typically give to anyone who asks me about adapting to the new title of clinical education coordinator for the respiratory therapy program at Washburn University in Topeka, KS. When I first applied for the position, I thought to myself how wonderful it would be to have a job in which I would not have to punch a time-card, or one in which I did not have to be awake when "normal" people were tucked away for their night of slumber. I would not have to worry about how the workload would be divided, whether I would have to put on my rollerblades to

accomplish the work, or whether I would have to drink 64 oz. of coffee to keep my head from accidentally bumping onto the table.

As my mind wandered on about all the benefits this job could entail there was only one thought that caused it to race — and that was the fact that I would have to stand in front of students and instruct. I remember, a few years ago, dreading the thought of having to give a speech to 15 of my classmates. Now, I would have to acquaint people whom I did not know with respiratory therapy knowledge in order to help them prepare for a lifetime of helping people. I was not sure that I could overcome this fear. These students would be looking to me for answers, and I questioned if I could give them answers that they desired.

I quickly overcame this fear when I interviewed for the position. I realized that I knew the information and the procedures, I could answer almost any question, and I knew where to find the answers to those that I couldn't. Today, I think back to my original apprehensions about this job and laugh at my insecurity. I realized that I had more knowledge than the students concerning respiratory therapy, and that I had been a respiratory therapist for over six years. I had explained procedures to patients, both young and elderly, and to students I had had as a clinical instructor. Once this fear had been put to rest, I told myself that I wanted this appointment and gratefully accepted the position.

Now it was time for me to tackle the transition from hospital to university life. The first obstacle that I faced was the fact that the wonderful thoughts I had had when I first applied for the position turned out to be a slight misconception on my part. True, I do not have to punch a time-clock; however, when the students are scheduled for clinic, I am responsible for them. They have to be able to reach me if there is a problem or if the clinical instructor at the facility they are attending does not have time to spend with them. In other words, when the instructor has his or her rollerblades on, sometimes the student cannot keep up. What this means is that I am "on call" 16 hours a day, five days a week. Although that sounds worse than it has been so far, the workload is not like it is in the hospital. I do not have to drink 64 oz. of coffee, but sometimes I feel as if I do need those rollerblades again (why did I sell them?).

My first seven months on the job have

been eventful. There have been days when I would not trade this experience for anything, but like any job, there are days when I think, "why is this happening?" For example, when I worked at the hospital as a staff therapist, I would take my workload, do whatever it took to get my job finished, give report to the oncoming shift, and then proceed home, usually not thinking about work until my next scheduled working day. But unless you are an administrator, working in a hospital setting does not teach the necessary administration knowledge and skills to be an educator. Thus, one of my greatest challenges has been simply managing 30 students in the clinic setting.

I have also had to refine my interpersonal skills, both at the university and at our clinical affiliates. I have learned to use these skills more effectively in motivating, communicating, and making decisions. This has included becoming more tolerant and understanding of persons who react differently to events.

Another great challenge that I have had to face is the change I had to make in my ideas about clinical procedures. When I was working as a respiratory care practitioner in the hospital, I had the tendency to practice the "clinic" way (the short-cut method). As an educator, I have had to transfer from the "clinic" behavior to the "textbook" behavior of practicing procedures. I must admit that I am still mentally recultivating the "correct" way to do procedures.

There are several things that have made the transition from the hospital to the classroom wonderful. One of the things that I have enjoyed is the interaction that I have attained with the students. When I first told the junior students about some of my own clinic experiences, their eyes and faces all told a story of fright and anxiety. However, after their first week of attending clinic, their eyes could have illuminated a dark room. I could hear them quietly talking to each other as they conferred about the different experiences of their first week. The excitement in their voices and smiles on their faces told me that they were enjoying the challenges they faced during their first days in the hospital.

The senior students' eyes and faces told a different story. When I first explained the new and more challenging concept of hemodynamic monitoring to them, they all looked at me with faces

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Education Bulletin

is published by the
**American Association
for Respiratory Care**
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and eyes skewed and blank. As time went on, I could see those blank faces light up as new concepts built on older ones, they understood what was being drilled into their minds, and it all finally “clicked.” It was, and is, awesome to see such an extraordinary sight.

Another thing that has made this transition easier is the fact that I have had a lot of support from coworkers. I have

made many new friends among educators and students alike. I am lucky to have clinical instructors who enjoy their jobs and welcome students into their facilities, willing to help educate them in any way that they can.

I sometimes envy the instructors and the students. At times I miss the excitement of working in the hospital setting, attending code blues, helping to save lives, and helping patients breathe easier. However, as an educator, I feel as if I am

not only providing instruction on how to help people breathe better, I am helping future patients by teaching respiratory care to new and excited people. As an educator I have the opportunity to help awaken new souls to a wonderful, caring, and challenging profession.

The transition from respiratory care practitioner to clinical education coordinator has been something that I will never forget — and one that I would not change for anything. ■

Contemplation of Ethical Dilemmas in the Respiratory Care Curriculum

by Bruce Feistner, MSS, RRT, director of the respiratory care program at Dakota State University, Madison, SD

To achieve great things, we must live as though we were never going to die.

- Luc, Marquis de Vauvenargues

Editor's Note: The following article is particularly pertinent given recent events in California involving a respiratory therapist who confessed - and then recanted - to killing more than 50 patients in his hospital whom he felt were terminally ill. Textbook titles on ethical principles and issues may be found by accessing these two web sites: www.ib.com (Login Brothers) and www.majors.com (JA Majors).

Consider the following scenarios:

1. You have a close friend, 22-years-old, who is very active in sports, academics, and life in general. Two months ago, he was the victim of a serious car accident in which he was ejected from the vehicle, landed in a pool of burning gas, and suffered extensive second and third degree burns. He severed his spinal cord and will spend the rest of his life as a paraplegic. He was in the ICU for five weeks, then on the regular floors for another three.

He is now at home. There is no chance he'll ever walk again. His depression levels have been getting more pronounced every day. He has had lengthy discussions with psychologists, pastoral staff, and family members, but nothing helps. His daily physical therapy sessions are extremely painful, and so are the burn dressing changes. He is unable to sleep well and is uncomfortable even sitting up in bed.

When you visit one day, he starts talking about life and death and . . . suicide. He is very negative. He then suddenly asks if you could get him a gun so he

could end his life. No amount of coaxing and reassuring does any good.

What would you do? Would you get a gun for him? Would you refuse? Would you tell his parents? Should he be forced to continue “living” as he is now? Would you talk him out of suicide? What if that was his only “option” at this point? What would you do?

2. You and a nurse are transporting a middle-aged patient to the OR. You have an intubation kit with you. He has a large tumor on his vocal cords and a partial airway obstruction, and has been receiving heliox therapy.

While going up to the OR, your elevator shuts down. While you are waiting to be rescued, the patient suddenly develops a complete airway obstruction. You are unable to intubate or ventilate the patient. You and the nurse agree that to save the patient, he needs an emergency trach.

This is the nurse's first day on the job after graduation. She does not feel qualified to perform a trach. Would you make an attempt at performing one? Would you do this even though it is not within your scope of practice? What would you do?

3. You have just come out of your family physician's office after your annual physical examination. During the exam, you noticed the doctor seemed unusually attentive and asked many questions she normally didn't ask. You were also aware that additional tests were ordered. She began by asking you if you had been unusually tired lately, to which you answered an honest, “Yes!” Then she carefully went over the results of your tests, especially the blood tests, before she casually mentioned her diagnosis was that of a “quick leukemia.” Then she went on to urge you to seek another opinion. She advised you to “set your house in order,” and to make sure you tell those

whom you want to know that you have five, maybe six WEEKS to live!

What would you do? In whom would you confide? Who would “be there” to help you in any and every way? What would your thoughts be during this time? What needs to be done regarding disposal of your earthly assets, plans for your funeral, etc.? What would you do in your last weeks of life? What would you do?

Scenarios such as the preceding, even though they may be a bit cheesy, serve to stimulate the respiratory care student to consider the ethical side of his or her daily workload. It sometimes seems as if these situations happen to someone else, but sooner or later, we will all be faced with an ethical dilemma. Thinking about cases such as these and discussing them with others in the program helps the student develop ways to proceed through difficult situations in a logical, knowledgeable manner.

One can either develop a freestanding ethics class or incorporate ethical situations into existing classes. By weaving ethics into the basics of our profession when the students are first introduced to it, and then continuing on into the more advanced topics, students become more familiar and comfortable with ethical dilemmas.

The discussion/debate method will probably make up the largest portion of an ethics class. Through short scenarios such as those above, the student can either form an opinion for debate in class, or prepare a written response. If the scenario is lengthier or requires more thought before forming an opinion, it is better addressed as a take-home assignment. If desired, the written paper can be used as a basis for in-class discussion.

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Many good ethical videos exist, but the problem is deciding which to use in class for that day. It seems as if the list is almost endless. In our program, we have even taken ethical situations from television and incorporated them into discussion. The program, "ER," has featured many situations that can stimulate lively debate. It is okay for students to disagree during these discussions - if they can support their viewpoint, that's acceptable. Commonly, a student may start the debate with a certain angle on the case but be "convinced" to change that stance as a result of the class discussion. That's okay! There aren't really right or wrong answers in most ethical situations, only varying shades of gray.

You don't always need to assign an exact article for the students. Merely suggesting an area or topic can be just as effective. With all the resources on the Internet and in libraries, there should be

no problem in finding something. You might suggest an area to pursue, such as problems relating to geriatrics, and the student can research anything pertinent. For example, I might guide the student into certain areas, such as active/passive euthanasia in geriatrics, living wills, advance directives, financial considerations, end of life issues, keeping people "alive," daily living considerations, etc. Depending on the breadth you give the students, they can find lots of material to discuss or write up.

It seems as if death and dying issues are a large part of an ethics class. After awhile, the students start thinking this is a rather ghoulish slant on the class. But if you consider the ties that medical ethics has to accepting or refusing therapies, patient rights, euthanasia, starting or stopping ventilators, etc., it all really comes together. If we can get students to understand that dying is a natural part of living, this will be a good starting place for discussions they will encounter. The

issue of dying at home with loved ones around, or with hospice workers present, versus dying in a hospital hooked up to all sorts of "technology" is a real concern to most people, and facing the issues and discussing them honestly and openly does much to alleviate fears.

Ethics classes can be as simple or complicated as you like. Weaving in a scenario now and then is a good way to introduce the student to the area. Whole weeks or whole classes on ethics serve to reinforce ideas and help the student form new opinions. If you find a seminar on ethics and its applications, feel free to get your students into it. The more viewpoints they get, the easier it will be for them to use ethics in their everyday work, and not shun it as "someone else's responsibility." Very often, we are the ethical resource persons in the workplace, and a good, applicable knowledge of ethics will help us serve our patients even better than we do now. ■

Respiratory Care Education Annual: Call for Papers

The Education Section of the AARC will publish volume eight of the Respiratory Care Education Annual (formerly the Distinguished Papers Monograph) in the spring of 1999. The annual is a refereed journal committed to providing a forum for research and theory in respiratory care education and is listed in the Cumulative Index to Nursing and Allied Health Literature.

The Education Section invites educators to submit papers for consideration.

Preference will be given to papers that emphasize original research, applied research, or evaluation of an educational method. Other topics which may be considered include interpretative reviews of literature, educational case studies, and point of view essays. Submissions will be reviewed based on originality, significance and contribution, soundness of scholarship (design, instrumentation, data analysis), generalizability to the education community, and overall quality of the paper.

Deadline for submission is December 1, 1998. Papers should be approximately six to ten pages in length and should follow the guidelines in the Publication Manual of the American Psychological Association, 4th Edition. Abstracts should not exceed 120 words. Submissions should be mailed to AARC Education Annual, 11030 Ables Lane, Dallas, TX 75229-4593. ■

U.S. Department of Education Battles Lender Scare Tactics

U.S. Secretary of Education Richard W. Riley has vowed to battle lenders who are attempting to frighten students, schools, and members of Congress into paying higher interest rates to preserve their current high profits on student loans. The action came after reports surfaced that some representatives of the banking industry are threatening to abandon the decades-old, federally guaranteed student loan program — known as the Federal Family Education Loan (FFEL) program — if the interest rate reduction Congress scheduled for this July 1 takes effect. Under the new regulation, a student who attends a four-year public college and borrows \$12,000 would save \$650 in interest over a standard ten year repayment period. Currently, 4.5 million

students borrow money for postsecondary education under the FFEL program, for a total of \$20 billion.

Says Riley, "In response to some lenders' scare tactics, the Education Department is taking steps to implement the broad authority granted by Congress to ensure continued access to FFEL loans. We are committed to assuring that no student is denied the financial help they need to go to college."

As part of the effort to ensure uninterrupted access to college student loans, the Department of Education has entered into discussions with the Student Loan Marketing Association (Sallie Mae) and contacted all 36 guaranty agencies about their capacity to fulfill their statutory obligation to issue loans if necessary.

These agencies are required by law to serve as "lenders of last resort."

One of these guaranty agencies, the Pennsylvania Higher Education Assistance Agency, has already informed the department that it could be available right away to make at least one million student loans to assist students across the nation. This is triple the number it currently makes and about one-fifth of all FFEL loans made nationwide.

In 1993, Congress scheduled the reduction in the student loan interest rate, which would save students hundreds to thousands of dollars over the life of their loans. For example, a master's degree student who borrows an average of

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\$20,000 would see a savings of \$1,050 over ten years of repayment, and a professional degree student who borrows \$60,000 would save \$3,200 in interest over ten years.

"The Administration's proposal promotes fairness for students and shareholders — a reasonable reduction in the interest rate to keep college affordable for students and families and a reasonable profit for banks," Riley said.

On Feb. 25, the Clinton Administration proposed a legislative change that would protect the lower interest rate and savings for students while assuring

lenders a sufficient financial return, so they can continue to make loans to students and families. A recent U.S. Treasury Department analysis indicates that Congress can address lender concerns and still give students the benefit of the interest rate cut.

Sallie Mae, the largest student lender, was created by Congress. Guaranty agencies are state agencies and private, non-profit corporations designated and subsidized by the Education Department to administer the federal guarantee should the borrower default on a FFEL loan. Guaranty agencies use federal funds to reimburse banks when a borrower defaults, and the loan is then turned over

to the guaranty agency for collection.

Riley believes that Sallie Mae and the guaranty agencies can ensure continued access to FFEL loans if necessary. Direct loans are an available option, as always, to schools that choose to make loans to students directly from the federal government instead of through private lenders.

"There is no reason for students and their parents to have anxiety over whether banks will still be issuing college loans. We are determined that no eligible student be denied aid. We will use every available provision of law to guarantee access to student loans," says Riley. (U.S. Department of Education Press Release) ■

Exercise-induced Asthma

by Christina L. McGee

Editor's Note: Christina McGee received the Morton B. Duggan, Jr., Memorial Education Award at the AARC Awards Ceremony on December 6, 1997 in New Orleans. She is a student in the RC program at the Medical College of Georgia in Augusta. Her winning paper on exercise-induced asthma is printed below. To obtain information on this and other competitive awards for RC students, contact the American Respiratory Care Foundation at (972) 243-2272.

Exercise-induced asthma (EIA) is described in Taber's Cyclopedic Medical Dictionary as an asthmatic attack that occurs during exercise.¹ While it has been estimated that 12% to 14% of the general population may suffer from EIA,² that percentage increases to as high as 80% in patients with a clinical diagnosis of asthma.³ However, with adequate patient education and proper medication, EIAsufferers can still lead a normal life. Ideally, there should be early detection of EIA through proper screening. If the disease is managed properly, a patient can excel and enjoy an improved quality of life. For instance, 11% of the 1984 United States Olympic Team was diagnosed with EIA. This did not prevent that group of 67 athletes from winning 41 medals.⁴

Symptoms of EIA may differ among patients. Some general symptoms may be shortness of breath, chest tightness, dyspnea, coughing, wheezing, fatigue, or not being able to recover rapidly after exercise.^{2,5} The common physiologic manifestations are hyperinflation, airflow limitation, and hypoxemia.⁵ A diagnosis may depend on such factors as patient history,

proper physical examinations, and pulmonary function tests. After a diagnosis is established, medications may be prescribed based on the patient's severity. There are also nonpharmacologic ways to prevent EIA that may be explained to the patient and implemented for successful long-term management.

Pathogenesis

The obstructive disease asthma is characterized by airway inflammation and hyperreactivity.² The bronchoconstriction that results in the obstruction seen in EIA is brought on by exercise. Exercise is a stimuli, like allergens, viral respiratory infections, or cold air, and as such can cause an airway hyperreactivity response.² This response may be a result of many factors. Unfortunately, there is not yet a complete understanding of the pathophysiology of EIA.²

There is a general agreement that the origin of EIA is closely associated with the changes in the heat and water of the tracheobronchial tree during the warming and humidifying of large volumes of air.⁵ Studies have shown that the temperature within the airways decreases with increased respiration. When ventilation begins to return to normal the temperature rapidly increases.^{6,7} The heat and water that are drawn from the respiratory tissue in order to warm and humidify the inspired air result in respiratory tissue water loss and airway cooling.⁷

Most individuals experience some bronchodilation during exercise. This, along with a widening of the glottis, helps the individual meet his or her increased oxygen needs during activity. Typically, bronchodilation is seen in EIA during or immediately following exercise. In EIA, the glottis will widen, but

the lower airways will constrict.² This results in an increase in respiratory demand. The constriction that is seen will usually occur within three to 15 minutes after the exercise is completed.⁸ The time of onset may change depending on environmental factors, such as temperature, humidity, or pollen, or it may depend on the type and duration of the exercise. Most patients will see an improvement in ventilation in approximately one hour after the onset of symptoms.⁹

The factors that influence the severity of EIA include the type of exercise, the duration of exercise, environmental conditions, viral respiratory infections, low fitness levels, amount of time since last episode of EIA,¹⁰ patient understanding, and medication use. These factors will help to determine how the patient's EIA should be treated. Some patients have found that if they continue to exercise when the symptoms occur, the severity is minimal. For other individuals it appears that short duration of exercise leads to an increased intensity of bronchospasm.^{9,11} Duration of exercise is not well understood, and therefore recommendations are not possible at this time.

If the patient participates in a second exercise within an hour or two of the first episode, less than half the initial degree of obstruction will be seen.² This is known as the "refractory period." The refractory period may vary among individuals. The degree of bronchospasm seen with the original EIAseems to have no role in the patient's refractory period. There are some factors that encourage the refractory period: warming up before exercising, breathing or exercising in humid environments, and prolonged exercise.²

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Diagnosis

Although EIA is not difficult to diagnose, there are different factors that help the physician determine a diagnosis. When a patient presents with the symptoms mentioned earlier, a careful history should be obtained if a previous clinical diagnosis of EIA has not been determined. This history will need to include the patient's symptoms, the duration of exercise, the onset of symptoms, and how long the symptoms normally last. It is also important to inquire about any medications that the individual may be taking.⁵ The patient's history will help to decrease the possibility of the physician misdiagnosing the episode. Since some individuals may ignore or deny that the symptoms occur, proper history from others, such as parents, peers, coaches, or teachers, may be necessary. This information will help the physician to determine the patient's sensitivity to exercise, the type of testing procedures that may be needed, and if any medications may be compromising the patient's ability.

After the patient history is obtained, specific testing procedures shall be performed to confirm the diagnosis of EIA. A 15% or greater decrease in peak expiratory flow rate (PEFR) or forced expiratory volume of air in the first second of expiration (FEV1) confirms a diagnosis of EIA.^{5,12,13,14} It must be noted whether a test is performed at the patient's highest level of achievement or if the patient's tachypnea is having a negative effect on the test results.

Some individuals with a previous diagnosis may use a peak flow meter regularly. If this is so, then the patient's baseline peak flow may be known and the physician can determine if the airways are narrowed by a 15% or greater drop from the normal.^{12,13} Although this technique may be a useful tool in diagnosis of severity, it may also be inaccurate. If the normal values are not known, a drop may not be noted. Also, the results from the peak flow meter are patient dependent. In an anxious patient a proper reading may not be attainable. The peak flow meter is best used for pre- and post-treatment and pre- and post-exercise readings. The double readings will indicate if there is a decrease in PEFR.

A spirometer may be used to measure the forced vital capacity from which the FEV1 may be obtained. This technique is also performed before and after exercise. As with the peak flow meter, the health care provider is looking for a 15% or greater decrease in the FEV1 in between the pre- and post-treatments.^{5,12,14} As stat-

ed earlier, if this decrease is observed, a diagnosis of EIA is confirmed.

Another technique to test for hyperresponsive airways is an exercise challenge test. Exercise testing is highly specific for EIA, and a positive result provides a good assurance of the presence of the disease.² For many patients, a treadmill is the most bronchoprovocative device.¹⁵ The grade of elevation that is ideal for this test is 10% to 15%.¹⁶ It is estimated that the test should be performed at 70% to 85%¹⁵ of the patient's maximal heart rate for approximately five to eight minutes.^{16,17} After the exercise is completed the patient is periodically questioned about any symptoms that have developed.¹⁵ The forced expiratory maneuvers should be performed at least two, five, ten, and 20 minutes after completion of the exercise.¹⁵ These results are compared to baseline spirometer values to help determine a decrease in FEV1. If symptoms are still occurring after 20 to 30 minutes, a bronchodilator may be administered.

Treatment

Nonpharmacologic

The ultimate goal of EIA treatment is to enable the patient to be able to participate in any activity he or she chooses and enjoy quality of life without experiencing the symptoms.¹³ This can be accomplished with both nonpharmacologic and pharmacologic intervention. The medication that is prescribed works best if the nonpharmacologic techniques are performed as specified by the patient's physician.

Before physical activity is started, the patient should perform a warm-up period.¹³ An experiment by Reiff, Choudry, Pride, and Ind¹⁸ studied seven subjects on a treadmill exercise test. Each volunteer performed two tests on two separate days. On day one a “standard” treadmill test (6 kph at 15% elevation for 6 minutes), followed 45 minutes later by an identical test, was performed. The second day, subjects ran 30 minutes at 6 kph with a 3% elevation for a “warm-up” run. The “warm-up” was followed 21 minutes later by the “standard” test described earlier. The experimenters found a 53% mean attenuation in maximal fall of PEFR after a “warm-up” run on the treadmill. This phenomenon was consistent in all seven of the subjects. A warm-up period is useful for scheduled activities but is not always practical for spontaneous increases in activity that can be found in everyday life.

Another technique is for the patient to increase his or her physical fitness level. This will not cure the patient's EIA, but it

may help to improve exercise tolerance, self-esteem, confidence, and psychological and physical well-being. The increase in fitness will allow the individual to participate in regular activities and decrease the incidence of asthma attacks.¹⁹

Exercising in a warm, humid environment may decrease the incidence of EIA. If outdoor conditions are cold and dry the patient can wear a face mask to create a warm and humid environment. Breathing through the nose rather than the mouth also helps to warm and humidify the inspired air.² The warming and humidifying of the inspired air helps to decrease the amount of water loss and the increased cooling of the tracheobronchial tree, therefore decreasing the occurrence of bronchospasms.

Pharmacologic

Even though the nonpharmacologic techniques are indicated, in some instances medication may be necessary. The most commonly prescribed medications are the beta2-agonists (albuterol, metaproterenol, pirbuterol, or salmeterol). A short acting beta2-agonist is the most effective agent for prevention of EIA in 80% to 95% of patients.^{13,20} Short-acting beta2-agonists have a rapid onset of five minutes,²¹ but their duration of effectiveness generally lasts for only two to three hours.^{5,13} Salmeterol, a long-acting beta2-agonist, can be used for prevention for ten to 12 hours.^{5,13,22} This may be more effective for children in school as they may not need additional medicine throughout the day. Salmeterol is not to be used as a rescue medication because of its slow onset of action,^{5,22} but it is an ideal drug for long-term management of EIA.

Beta2-agonists are bronchodilators which stimulate beta-2 receptors in the body.²³ This stimulation results in bronchodilation and inhibition of inflammatory mediator release, and stimulates mucociliary clearance.²⁴ The preferred route of administration is inhalation. By inhaling this drug, onset is rapid, doses are smaller, side effects are reduced, and the drug is delivered directly to the target organ.²⁴ The most common side effects that are seen with beta2-agonists are tremors, palpitations, headaches, increased blood pressure, nervousness, dizziness, and nausea.²⁴

Cromolyn sodium and nedocromil sodium taken before exercise are also effective treatments for prevention of EIA. Cromolyn sodium pretreatment results in inhibition of mast cell degranulation.²⁴ This drug is often referred to as a “mast cell stabilizer” because of its abili-

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ty to block the release of the chemical mediators of inflammation.²⁴ The overall incidence of adverse effects is reported at 2%.²⁵ Some of the reactions seen when using the dry powder form are throat irritation, hoarseness, dry mouth, cough, or a feeling of chest tightness.²⁴ Nedocromil sodium is a cromolyn-like drug in its actions and uses. The most common side effects of nedocromil sodium are an unpleasant taste, headaches, nausea, vomiting, or dizziness.²⁶ Both of these drugs are classified as antiasthmatic drugs.²⁴ These are second-line therapies because they only decrease the response to exercise.¹⁸

Inhaled heparin is another drug that is used for preventing bronchoconstriction in EIA. Ahmed, Garrigo, and Danta²⁷ studied inhaled heparin's effect on exercise-induced bronchoconstriction. Twelve asymptomatic volunteers with a history of EIA were tested over a five day period. The patients' pulmonary functions were measured with a spirometer before exercise and serially for 30 minutes following the challenge. The patients then inhaled heparin 45 minutes prior to the ten minute exercise challenge which was explained earlier. The results from this study suggest that inhaled heparin prevents post-exercise bronchoconstriction in subjects with a history of EIA. The mechanism by which inhaled heparin attenuates EIA is not yet understood.

Other medications that have been recommended for prevention of EIA include corticosteroids, oral theophylline, and ipratropium bromide. The corticosteroids improve asthma symptoms by reducing airway inflammation and bronchial hyperreactivity.² It has been stated that the addition of an inhaled corticosteroid to a first-line beta2-agonist treatment will reduce airway hyperresponsiveness.²⁸ Oral theophylline, when given with a beta2-agonist, has provided successful

treatment against asthma.²⁴ In EIA, continual theophylline is not considered a first-line therapy and alternative medications (such as cromolyn sodium²⁴) may be used. Ipratropium bromide's use in EIA is limited compared to beta2-agonists use.²⁴ Some additive effects have been found when ipratropium bromide is combined with a beta2-agonist,²⁴ but further research is still needed to support such a treatment plan. When used alone, ipratropium bromide has been found to be effective in only 30% to 40% of patients.^{5,19}

If symptoms are still noted after these treatments, the health care provider may consider improper drug delivery, poor fitness levels, or another cause of breathlessness. A spacer may be needed or additional lessons in the use of metered dose inhalers (MDIs) may be given, followed by direct assessment of the patient's MDI technique. A proper fitness regimen should be planned for the individual that will meet his or her physical level and daily activity. Additional testing may be necessary to exclude other causes of breathlessness.

Screening

Some individuals are considered to be at high risk for EIA. Such risks include: a previous diagnosis of asthma or allergies, the African-American race, poverty, and living in an inner city.²⁸ Early detection of EIA, by screening, can lead to earlier treatment and education programs and improved quality of life.

The earlier in life that an individual is diagnosed with EIA, the more beneficial it may be to him or her. A study by Heaman and Estes²⁸ performed free-running asthma screening tests and PEFr measurements on school children ages ten to 13 in rural Alabama. Out of the 437 children screened, 25 had a greater than 15% decrease in PEFr, which is indicative of EIA. Of those 25 children, three reported a diagnosis of asthma, and seven

had a history of asthma according to the school nurse. It was also found, through an examination of school records, that the average number of absences from school among these children was approximately two times higher than the national mean.

Use of the free-running asthma screening test and PEFr allows for a simple quantifying approach to screening individuals for EIA.²⁸ Once a diagnosis has been confirmed, patient education can improve the child's health, school attendance, and school performance.²⁹ Children with EIA can be taught how to manage their disease so that they can participate in physical activities with their classmates. Asthma touches all aspects of a child's life. It impinges on learning, play activities, and psychosocial development, as well as disrupting family life.³⁰

Summary

Although the underlying cause of EIA remains unclear, research has provided ways to prevent attacks from occurring. By following a physician's recommended management plan and fitness regimen, a patient will be able to participate in most any activity he or she chooses to undertake. Through the process of screening, individuals may learn for the first time that it is not necessary for them to be extremely short of breath after physical activities. These individuals could discover that they have a disease process that can be maintained by physician care and long-term management. The changes that they experience may give them an opportunity to participate in any activity of their choice and not live a sedentary life. To many individuals, the opportunity to be active and symptom-free will enhance their quality of life. Respiratory therapists should continue to play a vital role in effective long-term management of asthma, including EIA, particularly when it comes to patient education. ■

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BEDDOES HALL



That's not quite what I meant by taking a constructivist learning approach in class.

Awards Deadline Reminder

A reminder to all program directors and interested parties from the American Respiratory Care Foundation (ARCF):

The application deadline for several ARCF awards is June 30, 1998.

For more information about the awards, contact Norma Hernández at the AARC Executive Office at 972/243-2272.