

Education Bulletin



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NOTES FROM THE EDITOR: **DARE TO BE DIFFERENT**

by David W. Chang, EdD, RRT

Genius is 1 percent inspiration and 99 percent perspiration.
—Thomas Edison

In the early 1950s, a young man went to Memphis trying to get a recording session from a music producer. The producer asked him "who do you sound like?" The young man replied "I don't sound like anybody else. I sound like myself." The young man was Elvis Presley and the rest is history—a significant musical achievement and milestone in the entertainment industry.

For centuries, educators have been trying to find the best way to teach their students. Literally millions of research studies have been done in areas such as learning theories, educational psychology, curriculum development, test construction, and evaluation methods. When the results of these research studies are interpreted and applied properly, they are certainly very useful in improving the learning outcomes of our students. But the downside of our information age is the vast numbers of research studies and amount of learning resources available at our disposal on a moment's notice (in most cases).

Because the amount of information available to us is accumulating at an exponential rate, sometimes we fall into the trap of using what is "in front of us." It is easy and tempting to read the first 50 "interesting" article abstracts obtained via a computer search, peruse an article with an appropriate title in a journal on the desk, or review a chapter from a textbook sitting on the bookshelf. But by doing so, we limit our knowledge base to what is in front of us. It is very much like repeating what we have heard or singing another person's song.

Elvis would not be a household name today had he performed in the same style and sung the same type of music as others of his day. He used his inspiration to be different and accomplished his achievements through hard work.

Like Elvis, we need to depart from the traditional and dare to be different in what we do. I believe we will teach our students well if we keep what is working, dump what is not, and use our inspiration and perspiration to do our very best.

NOTES FROM THE CHAIR

by Mark Diana, MBA, RRT

The further backward you look, the further forward you can see.

—Winston Churchill

I have been looking over past editions of the *Education Section Bulletin*, hoping to find some inspiration for my first "Notes from the Chair." What I found was an even greater appreciation for our previous chair, Debra Lierl. I am sure that most, if not all, of you recall the turmoil that consumed the Education Section (and others) two years ago when the AARC withdrew its sponsorship of the JRCRTE. Since she had been appointed before the situation developed, Debbie was thrown into the middle of this firestorm through little choice of her own.

I have often asked myself what I would do under similar circumstances. Many of the options would be unproductive, and perhaps further aggravate the situation. Others might be more productive but would keep the section's focus on the politics of the situation. I do not mean to imply that the Education Section should not concern itself with the political operations of the AARC—only that focusing on such things tends to lead us away from the many other things the section should be focusing on— primarily educating a workforce for the changing health care environment.

Of course, what I would have done is irrelevant. What Debbie did was to push all of us to consider what we should be doing as a section and how we should go about doing it. While she did not ignore the JRCRTE issue, she forced us to move on to the issues we needed to face. I have watched many people in leadership roles, but few have faced the kind of challenges Debbie did when she took over as chair of the section. I was repeatedly impressed by the way she managed herself throughout. I learned from watching her, and I wanted to publicly thank her for her efforts and contribution.

On to some administrative matters. I have appointed the following individuals as committee chairs:

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1997 Calendar

Deadline

July 12 CRTT Exam	May 1
Fall OPEN FORUM Abstracts (Final)	May 27
AARC Summer Forum (Phoenix, AZ)	July 25-27
December 6 RRT Exam	August 1
December 6 RPFT Exam	September 1
AARC Convention (New Orleans)	December 6-9

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Many of you volunteered for committee service at the Education Section meeting in San Diego and I am now in the process of finalizing committee memberships. However, opportunities for service still exist, so if you are interested in serving on a committee, contact me at the address/numbers listed on the back page of this issue.

As I am sure you are all aware, the Education Section has started an e-mail discussion group, called a listserv. Instructions for joining

the list are on page 15. Only members of the section are able to join the list. The list is moderated, which means that any message sent to the list must be approved by the moderator before it goes to everyone else on the list. As section chair, I am currently serving as moderator of the list.

We are the first specialty section to try a listserv. If we are successful, other sections may start their own lists. I hope and expect that this discussion group will offer a valuable means for those of us in the educational community to share information and communicate ideas.

I was fortunate enough to be able to attend the most recent journal conference sponsored by *Respiratory Care*. The topic of this conference was managed care and its impact on the practice of the profession. The first day featured an overview of the structure of the health care delivery system in the United States and the various factors that have led to the emergence of managed care. The second day was devoted to the opportunities and possible responses to managed care across the spectrum of delivery sites.

One of the most striking things I heard at this conference came during the second day. Almost without exception, after presenting the opportunities they saw in the setting they were assigned, each speaker commented on the need for a practitioner who can interact as a professional on an equal footing with the other members of the health care team. It was clear from the discussion throughout the second day that most of the speakers did not believe the educational community was preparing the kind of practitioner they believe is needed to practice in the managed care environment.

This in itself is not particularly striking. Anyone who has been an educator for any period of time has been told that they are not producing the kind of graduate the community needs. Historically, this referred to the graduate's inability to perform a particular procedure the way a particular employer wanted it performed, or the graduate's unfamiliarity with a particular piece of equipment the employer used. This time it is different.

This time we are being challenged to provide a different kind of person—one who behaves differently and interacts with others differently. I do not know about you, but I am not at all sure how to do that. Much like teaching critical thinking, I do not know exactly how to teach professionalism. I know how to model it, and I know how to express disapproval when I see what I consider to be unprofessional behavior. I have been doing that for years. But instructing my students in professionalism is another story.

As with many of the other issues between the educational community and the employment community, however, I think the answer lies in both camps. I cannot model professional behavior and expect my students to follow my lead if, whenever they are on clinical rotations, they see a staff of unprofessional individuals. We are all responsible for not tolerating unprofessional activities by our students, graduates, practitioners, or managers.

During one of the many discussions on this issue at the conference, one participant asked why the educational programs were not responding to this and all of the other issues related to managed care and the changing workplace environment. That comment pointed out to me one of our major problems—i.e., our unwillingness to go forth and publicize all of the things we are doing to respond. I know we all are addressing these issues in innovative and exciting ways, because many of you have told me what you are doing. Now we need to tell the rest of the world, and this publication and this section is the place to start. So I challenge each of you not only to raise similar issues, but to use your membership in the Education Section to tell us how you are responding, and what else you think we can or should do.

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CRITICAL THINKING: WHERE DO WE GO FROM HERE?

by Ronald G. Beckett, PhD, RRT

Ronald G. Beckett is the chairman of the Department of Cardiopulmonary Sciences at Quinnipiac College in Hamden, CT.

The reflective processes employed in strong sense critical thinking will contribute to the development of an RCP who is a creative, flexible, clinically accurate decision maker with the skills necessary to continue learning throughout his or her entire life.

Critical thinking is clearly a major construct receiving considerable attention within both the respiratory care educational community and varied respiratory care work settings. Increased complexity of respiratory care technique and instrumentation, as well as role diversification, job redesign, clinical practice guidelines, care protocols, and critical pathways have all challenged the respiratory care community to examine the manner in which we make decisions regarding our patients' care.

The educational community has responded to the need to develop critical thinking abilities among students by employing a variety of instructional methods designed to improve the learner's critical thinking skills. Instructional methods intended to support the development of critical thinking include: 1) case study approach in contrast to the traditional outline format, 2) teaching critical thinking "procedures," 3) involving the student in more active learning, 4) clinical simulations with increasing complexity, and 5) case study critique. Additional instructional methods are being researched with the intent of improving the critical thinking of our students. As the educational community examines the development and application of critical thinking, clarification of the construct embodied by the term "critical thinking" will assist in defining the parameters and limitations of the critical thinking concept.

Respiratory care education has adopted a biomedical model of scientific inquiry which permeates our clinical practice guidelines, protocols, and decision making processes. Respiratory care programs require students to develop the skills required to respond to clearly stated, well structured, unambiguous problems. For the most part, respiratory care programs prepare students to analyze and solve problems for which there is a right or "most" right response.

The definition of critical thinking as a logical, rational process of making decisions within a specific contextual setting has been referred to in the literature as "weak sense" critical thinking. The skills of weak sense critical thinking, including logical deductive rationale decision making, are, without a doubt, of tremendous value to our students and, more importantly, to the patients those students will care for. Historically, RCPs have used weak sense critical thinking at the bedside. Given the tremendous changes sweeping our field and the health care industry, never before has weak sense critical thinking been needed so desperately. Programs in respiratory care must continue to develop analytical skills in students who will be required to develop logical deductive thinking.

However, while the logical deductive characteristics of weak sense critical thinking are useful in making many clinical decisions in the practice of respiratory care, they do not challenge the individual making the decision to go beyond the boundaries of conventional thought. Perhaps there are additional thinking challenges respiratory care educators could impose on their students to expand the boundaries of the current critical thinking construct.

Challenges posed through creativity and research are inherent in many respiratory care programs and do expand the weak sense critical thinking boundaries. Creativity and research processes help the learner to consider or create alternate solutions to clinical problems. The practice of creativity and research methods instruction within respiratory care programs will no doubt continue to grow as our field continues to diversify and as our instrumentation allows refined assessment of clinical data. With more of our students viewing our profession and practice through the critical lens of creativity and research, individuals within our profession will be better able to create proactive, rather than reactive, change for the benefit of patients.

In addition to incorporating logical deductive critical thinking, creativity, and research into our curricula, respiratory care educators also need to examine and influence the development of "strong sense" critical thinking among students. In contrast to weak sense critical thinking, strong sense critical thinking is described in the literature not only as involving logical decision making but also as accepting responsibility for one's thinking through empathy, examination of thinking for self-deception, integrity, fairness, thinking multi-logically, and thinking beyond one's own vested interests.

Strong sense critical thinking takes a more global perspective, suggesting that critical thinking goes beyond a given context and is applied to all aspects of the individual's life. The concept of strong sense critical thinking includes the importance of reflective judgments and is considered developmental in nature. Students need to understand the implications of each logical deductive decision they make. Students should know not only what difference a given decision makes regarding the clinical course of the particular patient case, but also what difference that decision makes to the department, the health care team, the profession, and the individual.

The reflective processes necessary to examine the depth of concerns described takes time, and in an acute clinical situation may not be accomplished on the spot. The outcome of the reflective strong sense critical thinking process will provide the learner with a sense of ownership of the decision. Through the ingredients of creativity and research, the learner will begin to consider alternative solutions and perhaps add to the professional scientific body of knowledge. A thought process requiring reflective consideration of decisions, along with creativity and research, will alter the epistemic assumptions of the student. Rather than viewing knowledge as something that simply exists and, therefore, is concrete and finite (logical deductive decision making), the student will see that knowledge is constructed by the process of reasonable inquiry into generalizable conjectures about the problem at hand.

In summary, as respiratory care educators move beyond the current concept of critical thinking we must: 1) provide our students with clinical decision making challenges based on the current body of knowledge in order to develop the skills necessary to make sound clinical decisions, 2) challenge our students to create and consider new research hypotheses which will potentially move our profession forward from a scientific point of view and expand the current construct of critical thinking, and 3) challenge our students to think critically in the strong sense; that is, to examine the decisions made and consider alternative approaches to solving a given problem through creativity and research.

The reflective processes employed in strong sense critical thinking will develop the student's sense of ownership, not only of our profession, but also of learning itself. This will contribute to the development of a respiratory care practitioner who is a creative, flexible, clinically accurate decision maker with the skills necessary to continue learning throughout his or her entire life.

HEALTH CARE INDUSTRY: A DECADE OF CHANGE

by Jacqueline Rogers, BS, RRT,
and Gale Harrington, RN, BA, CCRN

Jacqueline Rogers is the senior instructor of the respiratory care program at Palm Beach Community College, Palm Beach Gardens, FL, and Gale Harrington is a critical care nurse at the Veterans' Administration Medical Center, West Palm Beach, FL.

Editor's Note: This two-part article provides background information on the state of the health care industry in the U.S. today and in the near future. RT students should find this article interesting and useful in their pursuit of a career in the hospital and home care settings.

Part One: The reasons for change in the health care industry over the last decade

It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change.

—Charles Darwin

Health care today is in a tremendous state of flux. Politicians are writing health care reforms (Rodeghero, 1994) and providers are coming together to form systems that have a greater chance of survival (Francis, 1992) in this environment. Given the importance of becoming part of an integrated delivery system under health care reform, the number and scope of these collaborative efforts will escalate (Kazemek, 1994). The goal is to become more effective and efficient in health care delivery.

In this time of rising costs and reform, providers are also streamlining and consolidating services in an attempt to avoid duplication and reduce costs to the customer, the patient. In many hospitals, changes in Medicare reimbursement are resulting in restructuring and a reduction in staff (Fink, 1988; Smith, 1988). The payer structure is undergoing a metamorphosis that is fostering new ways of providing health care, and prospective payments of patient-incurred costs have tightened hospital operating budgets. Nearly 40 million Americans have no health insurance

and millions are just a pink slip or illness away from losing their insurance. Eighty-four percent of the uninsured in 1993 were working families, and more than 55% were headed by full-time workers (Rosco, 1995). Health care organizations are left with costs incurred by the uninsured that are not covered by government assistance.

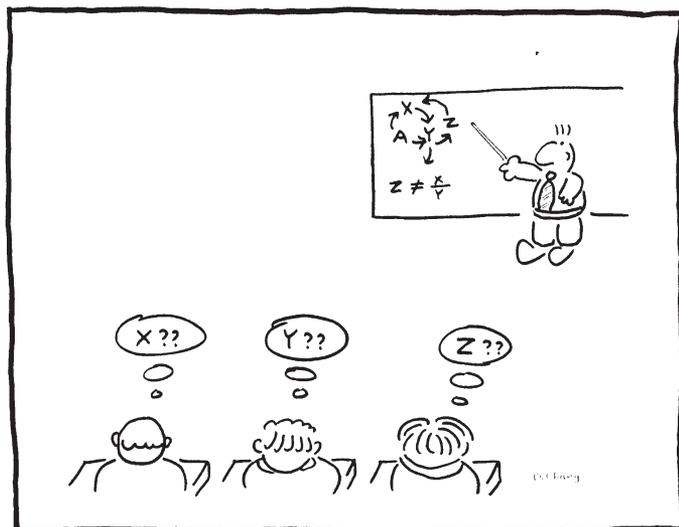
To cope with this environment, private hospitals are merging to become part of integrated systems that will allow them to remain somewhat independent and avoid being bought by large chains or insurance companies. Merger strategy stems from the belief that bigger companies that offer a variety of services over a wide geographical area stand the best chance of surviving the changes in Medicare reimbursement and a spreading system of payment called capitation (Eckholm, 1995; Johnson, 1993). Under capitation, doctors receive preset sums of money to provide all care to groups of people, a practice that has resulted in the proliferation of Health Maintenance Organizations (HMOs). Capitation forces hospitals to slash costs and redirect goals (Eckholm, 1995; Rodeghero, 1994) and they are grappling with various strategies to remain financially stable (Eckholm, 1995).

Clearly, HMOs are the result of competition for the shrinking health care dollar. Hospitals once typified by acute-care beds closely tended by doctors, nurses, and other skilled professionals with dazzling diagnostic tools are now being called "cost centers." Of particular concern is the effect that all this is having on the workforce. Many organizations initiate downsizing to obtain maximum output with minimal input, but that causes insecurity and trauma among employees (Ferris, 1993; Womack, 1994). Under normal working conditions, employees work to only two-thirds of their capacity, but cutbacks and layoffs decrease productivity further and morale sinks as employees are unable to focus on their jobs. Workers are being asked to do more with less—less staff, less resources, and less time (Graham & Unruh, 1990).

Exacerbating the problem is the fact that cutbacks are frequently implemented without staff input—managers, rather than staff members, decide on the nature and volume of work. This concept makes employees feel as if they have no control over the situation and fosters additional anxiety and uncertainty (Shahady, 1993). These additional burdens and lowered morale encourage the employee to want to terminate (Smith, 1988).

At the same time, consumer demands for greater efficiency of their health care dollar are encouraging the community to accept any cutbacks hospitals propose. These cutbacks are usually marketed as a way to reduce duplication of services and staff (Fink, 1988; Greene, 1992), but when operating margins are diverted from community programs (Eckholm, 1995), the programs and services offered to the community become more limited in scope. Ultimately, the reduction of these programs is viewed as having a negative effect on the community, and that, in turn, determines the long-term success of any merger or cut-back attempt (Danowski, 1994).

Although today's cost squeeze has its roots in the Reagan-era health care regulations, now health care executives are shutting down patient care units—even entire hospitals—for reasons that stem from what one might call a patient shortage. Competition for patients increases as hospitals shift from inpatient to outpatient care, and regional competition may be triggered (Greene, 1992; Smith, 1988). Fewer hospital admissions and shorter lengths-of-stay (LOS) have triggered unprecedented layoffs of nurses and other health care workers. One estimate, by the University of California at San Francisco's Center for Health Professionals, predicts that 200,000 to 300,000 hospital nurses could lose their jobs by the end of the century, forced out by the shift from inpatient to outpatient care (Grayson, 1995).



To begin your first day in the RT program, let's start with some critical thinking.

Patients coming to the hospital are referred by and to groups of physicians known as primary care or managed care physicians. The office practices of these physicians are being purchased by the hospital, which reduces the physicians' overhead and expense of running an office. This trend from private practice to managed practice also stems from political reforms and capitation (Rodeghero, 1994).

Part Two: Personal assessment of the change and direction for the future

Were these accidents the result of malpractice, downsizing, or personnel cuts? One must pose that question.

There is no question that hospitals must cut costs. Managed care is forcing everyone and everything in health care to change. Much of the focus to date has been on altering the organization and the financing of health care costs. Reforming health care will also require the customer to think seriously about the goals and ends of medicine, but there appears to be little change in the direction already established. Reforms have been written into law and the industry must operate in this climate of cut-backs, downsizing, and competition. However, there are means to salvage the people who have been hardest hit by these changes.

Changes in the health care industry require a need for perceptive human resource planning (Fink, 1988; Lyncheski & McDermott, 1993). Managers must consider employees' feelings, especially regarding internal culture issues (Britt, 1995; Ferris, 1993). The major concern of employees is how all the changes will affect them in both the short term and the long term (Fink, 1988). Employee morale can also be influenced by the managers' morale, especially if negativity is observed by the staff.

Gaining employee participation in change from the beginning through open communication and a formal system for disseminating important information will promote the change process (Bers, 1994; Fink, 1988; Gutknecht & Keys, 1993; Kenrick, 1993; Sherer, 1994; Smith, 1988). Managers who emphasize communication and feedback can help employees adapt to change in the organization (Huret, 1993; Marshall & Yorks, 1994; Montague, 1994).

Integration of employee goals with the goals of the organization is of extreme importance in this process (Sherer, 1994; Smith, 1988). When individual goals match organizational goals there is a greater probability that employees will respond positively to challenges and changes in the workplace (Fink, 1988; Huret, 1993; Smith, 1988). With aligned goals, an *esprit de corps* develops that provides a basis for accomplishing exceedingly difficult tasks or change (Smith, 1988). Employee participation is integral to morale and they need opportunities to vent their feelings about change and voice concerns (Bers, 1994; Britt, 1995; Conroy, 1992; Fink, 1988). Managers need to find out from employees what is important to them and search for creative solutions (Darling, 1994).

As the old world of health care is dying and the new world is being born, the nursing and respiratory professions are both suffering the pains of re-engineering. Nurses and therapists alike feel like they are being squeezed in the middle of a major change. Nurses are losing their jobs while therapists see positions lost due to attrition and more work spread among fewer people. Two-thirds of the nation's 2.2 million nurses are employed by hospitals, where they comprise 25% of the payroll and up to 50% of the staff. But predictions that about 300,000 of these positions will be eliminated in the next four years don't bode well for the future. Indeed, those still employed are already finding that nursing is not the same profession they prepared for (Lumsdon, 1995).

Nurses are providing the majority of patient care all day, every day, and because of their sheer numbers and type of work per-

formed, they are feeling the effects of cost-cutting from every angle. In a 1994 survey of 1,800 nurses conducted by the American Nurses Association, the majority reported their employers had cut RN positions in the previous year. The respondents added that the remaining nurses had to do more with less, and that they were concerned about the quality of care and patient safety (Lumsdon, 1995). Nurses who still give direct patient care are dealing with sicker patients and the nurse has less time to give to them.

Educators and managers must realize that resources to reward employees diminish as a result of prospective payments and other constraints. Other methods of recognition should be investigated to boost morale and productivity—such as the manager who personally congratulates employees who are doing a good job. Medical technologists ranked this technique as the highest motivational tool (Graham & Unruh, 1990). Investing in employee development and training is tantamount to retaining valuable employees in this ever-changing industry. Managers should visualize employee potential and identify opportunities and options for them (Darling, 1994; Fink, 1988).

Organizations and managers also need to alter their beliefs and assumptions about employee behavior and consider what is driving productivity. Real productivity is self-generated and motivation is highly individualistic (Arnold & Plas, 1993; Graham & Unruh, 1990). A lack of initiative results when there is nothing to compel initiative and when there is no intrinsic or extrinsic payoff for an action (Arnold & Plas, 1993). Managers must believe that employees will make decisions that are in the best interest of "their" company if they have aligned goals and feel ownership of the organization.

Since the health care industry will not be reverting to its former state, managers must help employees react to and understand the changes expected of them. Change is a process that most people resist, especially if it is not self-initiated. A person reacts in one of three ways to change: accepting and supporting; complying in action but not in spirit; or resisting change either actively or passively. Helping employees cope with change will raise the odds that they will remain productive and focused during, and long after, the change has been implemented (McKnight & Thompson, 1990).

Job redesign must be thoroughly reviewed, and supported with training and supervision. Redesign frequently shifts some duties previously handled by nurses, for example, to unlicensed aides working under the supervision of a nurse. Most nurses entered the profession to give direct patient care and now find themselves supervisors of nurses' aides performing nurses' duties. This has resulted in anger, frustration, and ultimately, fighting between nursing and hospital management. Unfortunately, the nurses are fighting for a fading tradition.

According to Connie Curran, vice president of the American Hospital Association and head of its affiliate American Association of Nurse Executives, "The only thing that will give you security in a changing environment is skills" (Lumsdon, 1995, p. 31). The California Nurses Association's approach insists that the health care field needs a consumer-style *watchdog* and a single payer schedule. New models of delivery of care may need to be developed, but, unfortunately, the models are being developed after the layoffs and cuts have occurred.

Hospital executives need to listen to the concerns voiced by the people responsible for patient care prior to making major changes to assure a safe future for the human element. Stories about patient care safety issues have been a daily occurrence in the news. Patients have had the wrong limbs removed, the wrong lung or breast removed, and in one instance, the patient died because the caregiver disconnected the wrong patient from the ventilator. Were these accidents the result of malpractice, downsizing, or personnel

cuts? One must pose that question.

Unlike other industries where the end products are objects or items, the medical community is, and must be, concerned with producing healthy human beings. Errors in industry can be costly—but errors in health care can be deadly.

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INTUBATION SUCKS! "OR" THE LITTLE RT THAT COULD

by Mary Jane Ausse

Editor's Note: The following two articles were written by Mary Jane Ausse, a patient with the mild form of Spinal Muscular Atrophy (SMA) and contributing author and supporter of Living SMArt, a publication dedicated to SMA patients, families, and SMA care providers. Both are reprinted with permission from Living SMArt, Vol. 3, Issue 2, April-May, 1996.

One night a new and very young RT came by and found me in usual form, gurgling and gasping for air. She seemed different somehow...

My 31st birthday was to herald in the best present for which my contorted frame could hope. A medical "miracle" known as a spinal fusion would transform me from a hunchback toad to a straight and noble princess, or so the doctors said. Though I had never experienced breathing problems, as an added bonus my respiratory function was slated to improve.

Alas, it was not to be. I awoke to a nightmare two days after surgery—drowning, unable to inhale past the sea of phlegm now occupying my lungs. Periodically, what felt like a Roto-Rooter pierced my bronchial tubes, drawing out great plugs of bloody secretions. I soon discovered there was an art to suctioning, but most nurses and RTs had the finesse of a plumber snaking a toilet! And so, wounded tissue would spew forth more secretions—the cycle seemed endless. For the first time in my life I was overwhelmed by my helplessness, by my inability to cough out the deluge, and by the fear that I might never breathe again!

Somehow the weeks passed. The abdominal swelling (a side-effect from the fusion) subsided and my diaphragm, which had been immobilized, was free once again to do its job. I could take leave of the respirator! The secretions, however, would not take leave of me; I was constantly struggling for air amidst the clogs and bogs. Out of desperation, my mom started maneuvering me around a bit—a push here, tug there—and noticed that by pushing, and yes, heartily "thrusting" against my stomach, some real gains could be made in evacuating the flood! This technique proved very time-consuming and exhausting for one person, so we tried earnestly to enlist the aid of medical staff. Unfortunately, they could not be convinced. My appeals for relief were placated with inhalation treatments which loosened the mucus a bit but did nothing to remove it.

One night a new and very young RT came by and found me in

usual form, gurgling and gasping for air. She seemed different somehow. I gave it my best educational effort, pleading for her to assist my cough. She listened carefully, and to my surprise, was actually receptive! She even attempted the cough maneuver, but was too short to get the leverage needed for a powerful thrust. The next thing I knew she was kneeling over me on the bed, her legs straddling my body. Then with both hands beneath my ribs, she began thrusting away! What a team we were! And what an ocean we moved that night! Ah! How wonderful it felt to inhale without constant effort, without the sweet breath of air having to compete with slimy, phlegmy secretions!

That night proved to be a turning point in my recuperation. No, my lungs would never again be what they once were, but the road to recovery was paved by my new RT. She recognized a legitimate need and creatively responded from her heart, doing whatever necessary to provide relief. Even now, twenty-plus years later, my eyes pool with tears in loving gratitude remembering the little RT who laid her job on the line that night, who stepped beyond the pages of her medical textbook to deliver a human service, and silently let me know I was worth it!



ASSISTED COUGH: A CRITICAL, LIFE-SAVING TECHNIQUE

by Mary Jane Ausse

The challenge to educate health care professionals in the techniques of assisted coughing lies clearly before us.

"We don't do that," was the response given by the ICU nurse to our editor, June Price, as she lay choking on phlegm. Her request for an assisted cough was denied! The one life-saving technique that would rid her lungs of the infectious sea of mucus was summarily DENIED! Though horrified, I was not surprised.

Memories of my own hospitalizations remain all too vivid. Without question, I could not have survived had my mother and I not stumbled upon the assisted cough maneuver after my first spinal fusion, when it became critically necessary to eliminate what felt like an ocean from my lungs. (See previous article.) Twenty-two years later, this technique is still clearing the waves from my airways but, I fear, remains largely unrecognized in the medical community.

As those with severe Spinal Muscular Atrophy (SMA) or other paralytic conditions can attest, due to insufficient inspiratory muscles, we are not able to generate enough intra-thoracic and abdominal pressure to raise lung secretions and eliminate mucus. Our cough is not productive. Nevertheless, secretions MUST be removed to avoid atelectasis, pneumonia, and eventually, the emergency room.

A normal cough requires a deep inhalation (insufflation) of approximately 85-90% of total lung capacity, followed by a cough powerful enough to achieve peak cough flows (PCF) of 360 L/m (liters per minutes) or more.¹ Individuals with severe SMA, however, may exhibit markedly reduced pre-cough inhalations and often have difficulty expelling profuse or tenacious sputum during upper respiratory infections, especially when PCFs are generated under 300 L/m.² (Cough flows can be measured with an inexpensive hand-held plastic peak flow meter available at local pharmacies.) When coughing is unproductive or PCFs are 180 L/m or less, speedy access to assisted coughing is needed.³ Research has now borne out what many persons with respiratory paralysis have ex-

perienced since the polio epidemic: the most efficient means of expelling mucus from the lungs is the assisted cough, be it manual or mechanical.

Manually assisted coughing is based on the same principle as the Heimlich maneuver. It involves strategically placed hands of a caregiver (under the ribs and over the diaphragm) to deliver an abdominal thrust synchronized to the individual's cough. The thrust is preceded by a deep inhalation, unassisted or achieved by IPPV or glossopharyngeal "frog" breathing. Additional chest compression may be utilized concurrent to the abdominal thrust.⁴

No complications to manually assisted coughing are cited,⁵ although the literature notes several cautions. Osteoporosis may preclude the use of chest compression. Marked scoliosis, deformity, and obesity may prevent optimal hand positioning for an effective thrust,^{5,6} and the technique would be contraindicated immediately following abdominal surgery.^{5,7} It should not be used subsequent to eating.⁴ The manual assisted cough does require the use of oropharyngeal muscle and precise coordination between caregiver and individual, in addition to adequate caregiver strength.⁵ Though highly effective, the maneuver is labor intensive, seldom utilized, and has virtually disappeared from health care curricula.^{6,7}

Since my first spinal fusion, which necessitated a temporary tracheostomy, I have employed several variations of this technique to successfully expel volumes of mucus that develop insidiously several times weekly. These coughing episodes are intensified by respiratory infections and may then last for 10-12 hours. My caregivers (mother and husband) have thus become experts in minute detail on where, when, and how hard to "punch" or thrust. When secretions develop, we are relentless and have even devised ways of achieving greater PCFs by pulling my knees into my chest while I lie on my back as a vigorous abdominal thrust is delivered. Each person must adapt and customize the maneuver to achieve optimal effectiveness.

When manual coughing assistance is not advisable or unproductive in raising pulmonary secretions, clinical practice and research indicates the most effective alternative is mechanical insufflation-exsufflation (MI-E).⁴

In 1953 the Cof-flator, a portable MI-E unit (operating on the concept of a vacuum cleaner) became available to deliver MI-E directly via mask, mouthpiece, or endotracheal tube.⁷ It discharged a deep positive pressure insufflation, followed by a negative pressure exsufflation which simulated normal coughing. Though successful in managing airway secretions, by the mid 1960s it was no longer manufactured because tracheostomy and tracheal suctioning became standard treatment.^{4,7}

Encouraged by the research efforts of Dr. John Bach, a pioneering physiatrist in pulmonary rehabilitation, the J.H. Emerson Co., Cambridge, MA, has recently manufactured a new MI-E unit. The portable In-Exsufflator delivers a positive pressure insufflation, then quickly shifts to a negative pressure exsufflation, generating air flows that more closely parallel a normal cough than does manually assisted coughing, with less than one-third of the abdominal and intrathoracic pressure produced by the healthy adult.⁶ It offers manual and automatic cycling. Approximately five MI-E cycles, followed by a period of 20-30 seconds of normal breathing, constitutes one treatment.⁸ An abdominal thrust synchronized to the exsufflation phase significantly increases PCF.^{7,9} Five or more treatments may be administered in one sitting, then repeated every 10-15 minutes as needed until airways are clear.^{4,8}

Dr. Bach reports the following clinical findings in the use of MI-E: clinical and animal studies have confirmed the effectiveness of MI-E without injurious effects to lung tissue; significant improvement in pulmonary flow rates, VC, and oxyhemoglobin

(SaO₂) were noted immediately following the elimination of mucus plugs; and secretions were effectively cleared in minutes from ventilator users after anesthesia, demonstrating the utility of MI-E for post-surgical patients.⁷ It has also been safely applied to unconscious individuals without complication.⁸ For persons with advanced neuromuscular conditions, elimination of pulmonary secretions via MI-E has resulted in lower incidence of respiratory complications and hospitalizations⁹ and has allowed them to avoid the discomfort and irritation associated with endotracheal intubation or tracheal suctioning during acute respiratory infections.^{7,8}

MI-E provides an alternative to invasive tracheal suctioning which is particularly beneficial since the intervention itself is problematic. Routine suctioning can cause irritation and increase secretions, often misses mucus plugs, may injure lung tissue, may plunge debris further into the lung, and often clears only superficial airway secretions.^{7,9} Case reports reveal that suctioning may at times contribute little to the total management of pulmonary secretions.¹⁰ The approach is limited to the trachea and right main bronchus; the left bronchial tree is anatomically less accessible. Consequently, in tracheostomy patients, 70% of pneumonia occurs in the left lobe.¹¹ From my own brief encounter with tracheal suctioning, I categorically support the clinical evidence that assisted coughing is more efficient in controlling and eliminating airway secretions. Nonetheless, there are individuals who require tracheostomy and do well with proper respiratory care and suctioning.

Despite the overall cost-effectiveness⁷ and personal preference for noninvasive procedures,¹² individuals requiring life-saving assisted coughing techniques will seldom find them in the arsenal of respiratory care practitioners. In the United States, the tendency to resort to high-tech instrumentation is supported by an insurance industry which generally funds invasive technologies rather than preventative, less heroic, less costly options.⁴ The use of MI-E has recently been shown to cut recuperation from respiratory infections in half. Patients and physicians alike in unsolicited testimonies have praised the new In-Exsufflator, calling it a "breakthrough," and "a miracle machine."¹³ Yet, third-party payment would be unlikely without extensive explanation and education,⁷ due in part to limited experience with the unit since its reintroduction in 1993.

As June can now verify, hospital personnel, respiratory therapists included, can be grossly deficient in knowledge and implementation of the manually or mechanically assisted cough. She survived pneumonia, and avoided invasive tracheal procedures through the quick mobilization of family, friends, and caregivers who, following her instructions, delivered the maneuvers necessary to ultimately clear her lungs. Others not having a teachable support system, may not be so fortunate. The challenge to educate health care professionals in the techniques of assisted coughing lies clearly before us.

Note: Each person is medically different and often unique and should contact his or her personal physician for specific information and treatment.

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Additional Resources

The International Ventilator Users Network (IVUN), 4207 Lindell Blvd., #110, St. Louis, MO 63108-2915. Joan L. Headley, Exec. Dir. Ph: 314/534-0475; Fax: 314/534-5070; Internet: gini_intl@msn.com
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A CURE ON THE HORIZON: GENE THERAPY FOR CYSTIC FIBROSIS

by Rebecca Jackvony

Editor's Note: Rebecca Jackvony was the 1996 recipient of the NBRC/AMP William W. Burgin, MD Scholarship and was recognized at the 1996 AARC Convention in San Diego. Her winning scholarship paper on gene therapy for cystic fibrosis is printed below.

Cystic fibrosis (CF) is the most common hereditary disorder in the United States, affecting as many as 30,000 people. It has also been estimated that as many as 12 million people may be carriers and not even know it. In order to inherit the disease, a baby must receive a defective gene from both parents. CF causes defective transport of sodium and chloride across the membranes of exocrine glands. The sweat produced by these patients has abnormally high concentrations of salt. Incidentally, this can be used as a method of detecting CF. CF also causes the pancreas to have abnormal production, secretion, and delivery of digestive enzymes. Luckily, this aspect of the disease is easily treated by administering enzyme replacement therapy and vitamins. Unfortunately, it is the effects of CF on the lungs that kills 95% of its victims.

The imbalance of sodium and chloride transport across the membranes of the epithelial cells that line the lungs causes a hyposecretion of fluid into the airways. Subsequently, the mucus in the airways is extremely thick and causes impaired mucociliary clearance and plugging of the small airways. This is the beginning of a cascade of negative events. When pathogens are present under these conditions they flourish. The immune response to the resultant infection is to combat it with neutrophils. The neutrophils digest the pathogens and release DNA and actin into the airways, which further increases the viscoelasticity and adhesion tension of the mucus.¹ At the same time, the lungs become inflamed, decreasing the luminal size, which, in turn, makes airway clearance even more difficult. Most often, this vicious cycle continues and leads to damage of lung tissue. After many years of these self-damaging cycles, the lungs suffer irreparable damage.

Because of these devastating effects on the lungs, CF patients rely on respiratory therapy to help manage their disease. "Chest physiotherapy (CPT) aims to improve ventilation and mucociliary clearance through the removal of tenacious and obstructing secretions".² CPT helps to improve pulmonary function and slow pulmonary deterioration. There are several airway clearance techniques that are a part of CPT that deserve mentioning. Among them are the directed cough, postural drainage, percussion and vibration, forced expiration technique, autogenic drainage, active cycle of breathing, positive expiratory pressure (PEP), high frequency chest wall compression, and the flutter valve. These techniques are often used in combination with one another to achieve a common goal. The respiratory therapist must take into consideration the degree of the patient's illness, the tolerance level, and the motivation of each individual when choosing a CPT regimen. It has also been shown that allowing the patient to participate in choosing CPT techniques can aid in motivation because the patient feels like he/she is more in control.¹⁵

In addition to relying on respiratory care, the CF patient also depends on drug therapy to help with the management of his or her disease. It has long been known that suppression of inflammation helps to prevent lung damage.¹ Patients have been given 1 mg/kg of prednisone every other day. This seems to improve pul-

monary function in patients with *Pseudomonas aeruginosa*, a common and destructive pathogen found in CF.¹ Another drug, amiloride, is a sodium channel blocker. This drug has small but considerable effects on mucociliary clearance.¹ In addition, non-toxic triphosphate nucleotides can be administered to stimulate alternate chloride channels.

Pulmozyme (Genetech) is the first drug aimed specifically at cystic fibrosis. This recombinant deoxyribonuclease is used in patients with mild to moderate lung disease and has been shown to improve lung function by 10-15%.¹ It works by breaking down the DNA in the airways. There is another drug that has not been approved by the FDA that is aimed at breaking down the actin in airways. If this drug is approved by the FDA, it can be given in conjunction with Pulmozyme to achieve synergistic mucolytic effects.

While the current treatments of CF have tripled the life expectancy of some patients, they do not constitute a cure. However, this no longer is an elusive goal. The defective gene for CF was discovered in 1989. It is called the cystic fibrosis transmembrane conductance regulator (CFTR) gene and it is located on chromosome 7q31-32.³ Since this discovery, scientists have been searching for a way to employ gene therapy as a cure for CF. Gene therapy, while still in its infancy, is progressing with major speed.

The goal of gene therapy is to replace the defective gene with a healthy one. "Because CF is an autosomal recessive disorder, introduction of a normal copy of the gene should result in restoration of normal chloride transport function".⁴ The theory is simple and logical. Yet actually getting the healthy gene incorporated into the host cell genome is anything but simple. Evolution has been taking place for millions of years. During this time, cells have become rather efficient at recognizing foreign material and then calling upon the immune system to get rid of it. In order for gene therapy to work, the healthy gene would have to get into the nucleus of the target cell without being recognized as foreign material. This makes viruses an ideal vector. Getting into the cell and taking over its mechanics is necessary to viral survival; therefore they are very efficient at it.

A virus is composed of DNA or RNA and is surrounded by a protein coat called a capsid. Scientists remove the gene or genes that make the virus pathogenic. In its place they insert a healthy CFTR gene. They also insert a promoter gene to turn on production of the CFTR protein. The DNA or RNA is then repackaged into its capsid. This newly revised virus, or viral vector, enters the host cell, where enzymes break down the capsid. The messenger RNA of the host cell reads the DNA or RNA of the vector for transcription and translation. The host cell is now capable of producing the protein, but the virus is not capable of causing disease. Several vectors have been studied for CFTR gene transfer, including the retrovirus, the adeno-associated virus, the adenovirus, and lipid mediated gene transfer.

A retrovirus contains single-strand RNA that is converted to DNA by reverse transcriptase. A retrovirus vector is created by deleting the gag, pol, and env genes and inserting a healthy CFTR gene. The gag gene encodes for a precursor polypeptide that yields the capsid protein. The pol gene encodes for reverse transcriptase and an enzyme involved in proviral integration. The env gene encodes for a precursor to the envelope glycoprotein.⁴ Without these genes the retrovirus becomes nonpathogenic.

Once in the cell, the genetic information is integrated directly into the host cell genome. However, gene transfer only takes place if the target cell is rapidly dividing. Bronchial epithelial cells do not rapidly divide. There is also the possibility of toxicity with chronic overexpression or insertional mutagenesis.⁵ Furthermore, this vector can only be produced in low titers. The largest disadvantage, or perhaps its greatest aspect, is that the retroviral vector

incorporates directly into the host cell genome, permanently changing the genetic information. If it does its job correctly, it could be the miracle cure scientists have been searching for. On the other hand, if it makes a mistake, who knows what the consequences will be? These limitations explain why this vector has been studied almost entirely in ex-vivo trials.⁵

The adeno-associated virus is from the Parvo family and contains single-stranded DNA. In humans, it only replicates in the presence of an adenovirus or a herpes virus. Without a coinfecting virus, it undergoes high frequency, stable DNA integration.⁶ This virus is so small that it can barely accommodate a healthy CFTR gene. This vector does not require cell replication in order to express its genes. It also has relative site specificity and holds less risk of mutagenesis.⁶ Preclinical studies have shown longer lasting gene expression and less toxicity than with the adenovirus.³ A negative aspect is that it is difficult to produce a large quantity, high titer virus. There is also evidence of episomal persistence.

One of the best studied vectors for CFTR gene transfer is the adenovirus. This virus frequently effects the respiratory tract and is responsible for causing the common cold. The adenovirus enters the cell by receptor-mediated endocytosis. Once in the nucleus, the viral DNA remains epichromosomal and does not get incorporated into the host cell genome. The host cell messenger RNA is used to replicate the viral DNA. When used as a vector, the CFTR protein is produced. The adenovirus is rendered nonpathogenic by the E1 deletion. This deletion makes the virus replication defective.³ There is also an E3 deletion to make more room for the healthy CFTR gene.³

A major advantage of using the adenovirus as a vector is that it is specific to the respiratory tract. In addition, because the viral DNA remains epichromosomal, the cell is not permanently damaged or altered. It is also capable of gene transfer into replicating or nonreplicating cells,⁵ and it is easily produced in high quantities. The adenovirus vector also has its disadvantages. For example, because it does not become a part of the host cell genome, the expression period is limited to the lifetime of the cell, so it must be administered repeatedly.⁵ The more a virus is introduced, the more the immune system will try to fight it. The antibodies are directed against the capsid, not the DNA. It is not known if these antibodies will limit the efficacy of repeat dosing.⁵ The adenovirus has been studied in both in-vivo and ex-vivo trials.

A promising nonviral vector is lipid mediated gene transfer. This vector is composed of a plasmid with CFTR complimentary DNA and a strong promoter gene. Because the plasmid is composed of lipid, it passes through the cell membrane rather easily. Once in the nucleus, the DNA most likely remains epichromosomal, where it utilizes the host cell messenger RNA for replication.³ Some advantages of this vector are that it is easy to prepare, it can accommodate unlimited gene sizes, it cannot replicate or recombine to form infection, and there are fewer inflammatory responses because of the lack of proteins.⁵ Its disadvantages are that it lacks cellular specificity, it is less efficient than the adenovirus, and it is not stable.

Even though the adeno vector and the lipid-mediated vector have been successful at gene transfer in-vivo, they have only demonstrated partial correction. The amount of gene transfer and expression is limited to a small fraction of target cells.⁵ This victory is not big enough to use gene transfer therapeutically, but it certainly can be considered a giant leap toward success. It proves that gene transfer is not impossible. Now it is merely a matter of refining it.

There are many obstacles that need to be overcome and many questions that need to be answered. For example, would it be better to use gene therapy as a treatment or a cure? If it were to be

used as a treatment, and the DNA remained epichromosomal, the virus would have to be administered repeatedly. With the risk of cellular immunity, how long could gene therapy be used safely and effectively? If it were to be used as a cure, what would happen if there was a mistake?

The possibilities of mistakes include insertional mutagenesis, insertion into the wrong position on the host cell genome, or incorporation into the wrong type of cell altogether. The ramifications of these mistakes may be large or small, but the resultant changes will last forever.

Another questionable outcome of gene transfer with any vector is the possibility of over expression of the CFTR gene. This can lead to increased cell volume and growth abnormalities. Current studies have shown that gene therapy has not been implicated in initiating a malignancy. However, the time period of this study is not long enough to provide definitive results.⁵ There is also the question of infecting people other than those for whom the viral vectors were intended.

All of these uncertainties need to become known facts before gene therapy can be used therapeutically. Study results have frequently been inconsistent. There have also been several studies in which preclinical animal trials yielded different results than human trials. To a certain point, this should be expected; after all, "Humans are not simply large mice."⁵

All in all, it is pretty safe to assume that gene therapy will be commonplace in the not so distant future. Scientists have come a long way in the seven short years since the CFTR gene was discovered. With the knowledge that researchers have already acquired, and the facts they are learning every day, successful gene transfer is only a matter of time.

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ASTHMA PHARMACOTHERAPY

by Urmi A. Masher

Editor's Note: Urmi A. Masher was the 1996 recipient of the NBRC/AMP Robert M. Lawrence, MD Scholarship and was recognized at the 1996 AARC Convention in San Diego. The winning scholarship paper on asthma pharmacotherapy is printed below.

Asthma is a pathologic pulmonary process characterized by reversible airway obstruction, inflammatory airway changes, and airway hyperresponsiveness to certain stimuli. Asthma commonly begins in early childhood, with a higher prevalence for males over females. There are an estimated ten million individuals afflicted with asthma in the US.¹ There has been a gradual increase in asthma mortality over the last 15 decades.² A substantial increase in hospitalizations has been noted world wide.³ Additionally, asthma is the most frequent nonsurgical indication for hospitalization in the pediatric population, accounting for 10% to 15% of the medical admissions.⁴

In terms of natural history for early-onset asthma, one-quarter of those affected as children will have persistence of symptoms as adults, one-quarter will be free of symptoms, and one half will have less frequent or episodic symptoms.⁵ Those afflicted with severe asthma in childhood tend to have chronic asthma as adults.⁶ The pathologic features of asthma can include injury and desquamation of the airway epithelium, mucosal airway edema, increased vascular permeability, smooth muscle spasm, and heterogeneous cellular infiltrate (particularly eosinophils) in the airway wall. Mast cells seem to play a significant role in the acute bronchoconstrictive response to inhaled allergens, via release of preformed substances such as histamine. Recruitment of other inflammatory cells such as eosinophils, neutrophils, monocytes, and

T lymphocytes via chemotactic factors (e.g., leukotriene B₄) and cytokines (e.g., IL4) seem to be directly responsible for the long-term inflammatory changes in the airways.

Signs and symptoms of an acute asthmatic attack vary with the severity of the attack. Generally, the symptoms can include coughing, wheezing, chest tightness, shortness of breath, and excessive mucous production. Objective signs during an acute attack may include a decrease in the forced expiratory volume during the first second and a decrease in the forced vital capacity, varying degrees of respiratory distress, tachypnea, tachycardia, and audible wheezes. It is very important to note that not all asthmatics wheeze, because with severe airway obstruction there may be few auscultatory findings. Laboratory findings may show eosinophilia, variable abnormalities in the arterial blood gases (depending on the severity of the asthma), and Charcot-Leyden crystals (elongated dipyrnidial) in the sputum. Chest x-ray findings can vary from normal to hyperinflation. Complications may include pneumothorax, mediastinal and subcutaneous emphysema (alveolar rupture and air dissections along vessels), atelectasis (usually the right middle lobe), bronchiectasis (rare), and cor pulmonale (rare). Conditions associated with asthma may include sinusitis, rhinitis, nasal polyps, eczema (atopic dermatitis), and gastroesophageal reflux. Chronic management of asthma begins with proper classification of asthma severity based both on subjective criteria (severity of symptoms and restriction of activity) and objective criteria (pulmonary function testing and number of emergency room visits/hospitalizations).

Another fundamental principle in the control of asthma is avoidance of environmental triggers. Adequate nutrition is also an integral part of management, as it is with other chronic disease processes. Lastly, when avoidance of triggers fails to control symptoms, pharmacotherapy plays a substantial role in alleviating symptoms as well as pathology.

Over the last 20 years, there has been a boom in the number and categories of medications available in the market. Categories include β -adrenergic agonists, phosphodiesterase inhibitors, anticholinergic agents, antihistamines, cromolyn and nedocromil, corticosteroids, hydration and expectorants, and immunotherapy. No one category is the best, and treatment has to be individualized based on presence of contraindications and other medical problems, efficacy, and the potential for adverse side effects. Successful pharmacological management should incorporate reversal of acute and chronic airway obstructions and the long-term attenuation and prophylaxis of the intrabronchial sequelae of inflammatory cells and mediators.

β -adrenergic agonists are the most commonly prescribed medications for acute and chronic asthma. They effectively relieve airway obstruction via their bronchodilator properties and by increasing mucociliary clearance. They also prevent bronchoconstriction by inhibiting mediator release from mast cells.⁷ β -agonist vary in their selectivity, from nonselective (β_1 and β_2) to β_2 -selective. Nonselective β -agonists tend to have more cardiovascular side effects than do β_2 -selective, therefore, the use of selective β_2 -agonists is preferable. Inhaled β_2 -agonists are preferable over oral β_2 -agonists because of their rapid onset of action and lower frequency of side effects. Oral β_2 -agonists are generally used only when inhaled β_2 -agonists are not tolerated or a long duration of action is desired. Inhaled β_2 -agonists should generally be used on an as-needed basis, as regular use may lead to tolerance and increased bronchial hyperresponsiveness. Tolerance is reversible with the administration of corticosteroids.⁸

Inhaled β_2 -agonists are the safest and most effective treatment for acute asthma, and serious side effects are uncommon. Of note, inhalation of any β -agonist may produce a life-threatening acute

paradoxical bronchospasm.⁹ The newly released agonist, salmeterol, is a highly selective, long acting β_2 -agonist. Its actions have been noted to last up to 12 hours. It does not have a rapid onset of action, and should not be used in significantly worsening asthma, in acute deterioration of asthma, in an acute attack, or as a substitute for corticosteroids.¹⁰ The use of β -agonists does not obviate the need for the early use of an anti-inflammatory drug. In recent years β -adrenergic agonists have come under fire, and blamed by many for playing a role in the increase in asthma mortality. Studies do not clearly support this belief.¹¹ In conclusion, inhaled β -agonists are effective for use in the treatment of chronic asthma and the treatment of choice for acute asthma.

Theophylline, a phosphodiesterase inhibitor, has been widely used and studied in the treatment of asthma. Theophylline's mechanism of action is not precisely known, but it has been shown to increase the levels of cAMP (possibly through the inhibition of phosphodiesterases), modulate intracellular calcium transport, antagonize prostaglandins, and inhibit adenosine receptors.¹² It has been recently noted to have an anti-inflammatory and immunomodulatory action at low doses,¹³ it has positive inotropic effect on the diaphragm, and it increases the ventilatory drive by direct stimulation of the respiratory center.

Maintenance therapy with theophylline decreases the frequency and severity of asthmatic symptoms,¹⁴ decreases the need for emergency medication¹⁵ (inhaled β -agonists and short course steroids), prevents exercised-induced bronchospasm,¹⁶ and has a corticosteroid-sparing effect.¹⁷ It is a less potent bronchodilator than β -adrenergic agonists,¹⁸ and therefore, less effective in the treatment of severe acute asthma. The regular use of theophylline requires periodic monitoring of blood levels since it metabolizes differently from person to person. It also has many drug-to-drug interactions that alter the drug's concentration in the blood. Theophylline toxicity can be very serious, including arrhythmias and seizures. In conclusion, theophylline is not a first line drug for the treatment of asthma, but is an effective adjuvant to first-line therapy.

Naturally occurring anticholinergic agents, such as jimsonweed, are some of the earliest known forms of asthma treatment. These agents influence the autonomic nervous system by decreasing the parasympathetic tone on the bronchial airways, thereby resulting in bronchodilation. Atropine (a tertiary compound that crosses the blood-brain barrier), ipratropium bromide (a quaternary compound that does not cross the blood-brain barrier), and glycopyrrolate (also a quaternary compound) are the most commonly used agents, usually in the inhaled form. Atropine's use is generally limited because of the high incidence of side effects with doses greater than two mg.¹⁹ Atropine has also been noted to mildly depress ciliary activity and mucous transport of particles. Ipratropium and glycopyrrolate have a significant bronchodilatory effect without serious side effects.²⁰ They also have no effect on mucous transport and ciliary activity.²¹

Studies examining the role of anticholinergics in the treatment of acute asthma demonstrate that they are not effective as single agents, and are significantly less effective than β -adrenergic agonists. Studies in patients with COPD who have partially reversible airflow obstruction have shown that anticholinergics are the most effective single therapy.²² The use of these substances had fallen out of favor because of the low efficacy and high incidence of serious side effects (cardiac and central nervous system), but now with the advent of quaternary anticholinergics that do not cross the blood-brain barrier, their use is increasing, especially in patients with COPD.

Antihistamines are a widely used category of drugs in the treatment of upper respiratory disease processes. Histamine release and the subsequent bronchoconstriction after allergen exposure has

been well known for over 40 years.²³ Their mechanism of action is to block histamine receptors competitively, thus preventing histamine molecules from binding and causing bronchoconstriction. Histamine also produces smooth muscle contraction, increases vascular permeability, and stimulates parasympathetic nerves. Histamine type 1 (H_1) receptor antagonists, such as chlorpheniramine and clemastine, that were initially used were limited because of their anti-cholinergic and sedative side effects at higher doses. But recent development of non-sedating H_1 receptor antagonists, such as terfenadine and astemizole, has allowed the use of antihistamines in the treatment of asthma to increase. Recent studies have shown that histamine accounts for significant airflow obstruction after allergen exposure, and pretreatment with antihistamines confers partial protection against the obstruction.^{24,25} As histamine is not the only mediator involved in exacerbation of asthma, it should be used only as an adjunct therapy for treatment.

Cromolyn sodium and nedocromil are the compounds most commonly used for the preventive treatment of asthma. The precise mechanism of action is not completely known, but they have been shown to have anti-inflammatory effects through the inhibition of mediator release, especially mast cells. These compounds have the ability to suppress the immediate and late-onset asthmatic response after allergen exposure.²⁶ Many clinical trials have shown that these drugs are an effective prophylactic agent for the treatment of mild-to-moderate asthma,²⁷ and they have an efficacy comparable to theophylline.²⁸ Trials in the prevention of exercise-induced bronchospasm have also shown cromolyn and nedocromil to be effective. The side effects are minor, such as throat irritation and dry mouth, and rarely life threatening bronchospasm.²⁹ Chronic usage has been shown to be safe, and may allow the reduction of the total daily steroid dose.³⁰ This category of drugs has no bronchodilatory effect. Cromolyn and nedocromil are anti-inflammatory agents used as preventive treatment for asthma, and are not indicated in the treatment of acute asthma.

Corticosteroids are the most recent new class of anti-asthmatic agents used clinically today. They are anti-inflammatory agents that decrease the inflammatory cell number and function, decrease cytokine gene expression, inhibit chemotaxis and mediator release, and decrease histamine synthesis.³¹⁻³³ They have been shown to decrease mucus secretion and suppress the late-phase reaction. With the renewed awareness of the importance of airway inflammation in the pathogenesis and chronicity of asthma, corticosteroids have come to the forefront of asthma management.

Corticosteroids can be administered via systemic routes (oral and intravenous) or through inhalation. For acute intractable asthma (status asthmaticus), intravenous corticosteroids can be life-saving when bronchodilators fail. The studies are unclear on the advantages of high doses therapy. In the treatment of acute asthma, recent studies have shown that the early administration of corticosteroids shortens the course, prevents relapse, and reduces the need for hospitalization.^{34,35} Systemic corticosteroids on a long-term basis have serious side effects, including hypothalamic-pituitary-adrenal suppression, hypertension, bone changes, cataracts, and changes in glucose metabolism. Once initiated in the treatment of acute asthma, systemic corticosteroid therapy should be continued until symptoms are controlled and the pulmonary functions are restored to normal.

If systemic corticosteroid therapy is used for less than six days, it is unnecessary to gradually taper the dose. But if it is used for longer periods, there is likely to be sufficient adrenal suppression to warrant gradual tapering of systemic corticosteroids over several weeks. Long term use of oral corticosteroids is recommended only when maximum use of bronchodilators, cromolyn, inhaled corticosteroids, or a combination of these therapies fail to control

chronic asthma. The lowest therapeutically effective dose for the shortest duration is recommended.

Inhaled, topically active, corticosteroids provide a good alternative to systemic corticosteroids for management of moderate to severe chronic asthma. Inhaled corticosteroids can provide a high degree of topical anti-inflammatory effects with minimal systemic side effects. In general it is believed that at recommended doses of inhaled corticosteroids, there is minimal suppression of the hypothalamic-pituitary-adrenal axis.³⁶ But in a recent study by Hanania et al,³⁷ they found that at conventional doses of inhaled steroids, adrenal suppression and decreased bone density can be seen in a dose related fashion. Further clinical testing is needed to substantiate this recent finding. Inhaled corticosteroids do not replace oral corticosteroids for the treatment of acute asthma.³⁸ In summary, corticosteroids currently have a place in the management of acute asthma and in the management of moderate to severe chronic asthma, but controversy still exists over long term side effects.

Alternative therapies for the management of asthma include hydration, expectorants, intravenous gold, methotrexate, troleandomycin (TAO), intravenous gamma-globulin, and other immunomodulatory agents. Adequate hydration is recommended for asthmatics, but over hydration can be very dangerous and life threatening.³⁹ The use of expectorants such as acetylcysteine, guaifenesin, and iodides is not routinely recommended and should be used only in select patients. Intravenous gold therapy may be of benefit in patients with severe corticosteroid-dependent asthma. Studies have shown that the use of intravenous gold can produce improvement in symptoms and reduce the mean daily dose of corticosteroids.^{40,41}

Methotrexate was traditionally a chemotherapeutic drug, and is now becoming more commonly used in the treatment of rheumatoid arthritis. It is thought to have anti-inflammatory properties, and has been proposed for the treatment of severe corticosteroid-dependent asthma. Clinical trials in the past have shown a mean corticosteroid dose reduction,⁴² but some recent trials show no significant reduction.^{43,44} Additionally, methotrexate has serious side effects such as interstitial pneumonitis, and renal and liver abnormalities.

The use of intravenous gamma-globulin has been proposed for its potential immunomodulatory effect. A recent clinical trial showed that the use of high-dose immunoglobulin in severe corticosteroid-dependent asthmatics reduced the corticosteroid dose required and produced improvement in the pulmonary functions.⁴⁵ Other anti-inflammatory or immunomodulatory agents proposed include dapsone, cyclosporine, and hydroxychloroquine. Clinical trials with these drugs have shown some benefit in the reduction of the corticosteroid dose in severe steroid-dependent asthma. A clinical trial in 1991 revealed that long term use of dapsone (6 to 13 months) reduced the steroid dose required.⁴⁶

The potential use of cyclosporine in the treatment of steroid-dependent asthma is unclear. Recent clinical trials have varied results. In a small clinical trial (12 patients) by Mungan et al,⁴⁷ the use of cyclosporine reduced the mean dose of prednisone from a mean of 31.43 mg to a mean of 8.57 mg ($P < 0.01$), while the average FEV₁ improved 34%. However, in a slightly larger study (34 patients) by Nizankawska et al,⁴⁸ they found the use of cyclosporine to only slightly reduce the dose of corticosteroids over placebo, and they also noted a slight impairment in pulmonary function. Cyclosporine can have severe toxicity, and its potential therapeutic benefit has yet to be established.

In a small trial of 11 patients, the use of hydroxychloroquine resulted in a 50% reduction in the oral corticosteroid dose.⁴⁹ Further testing on all these alternative therapies is still warranted to establish their role in asthma treatment.

Drugs affecting the leukotriene pathway are the newest class emerging in the treatment of asthma. In a limited number of clinical trials they have been shown to have a therapeutic benefit, but their efficacy compared with the current anti-asthma medication is still unknown.⁵⁰ Clinical trials reveal that these drugs are safe and well tolerated, and they have effect in mild to moderately severe asthma in the absence of inhaled steroids. Other prospective anti-asthmatic agents include inhaled diuretics, potassium channel blockers, bradykinin antagonists, anticytokines, cromolyn-like agents, and other anti-inflammatory agents.⁵¹

In conclusion, there are a multitude of anti-asthmatic medications available, and treatment has to be individualized. The most commonly used are still the β -adrenergic agonist, though inhaled corticosteroids are becoming more frequently used as the awareness of asthma as an inflammatory process is revived. The search for better and more effective pharmacological agents in the treatment of asthma is at the forefront of medical research today. With increased recognition of asthma as an inflammatory disease process of the airways, the newer agents being developed seem to focus on fighting this process.

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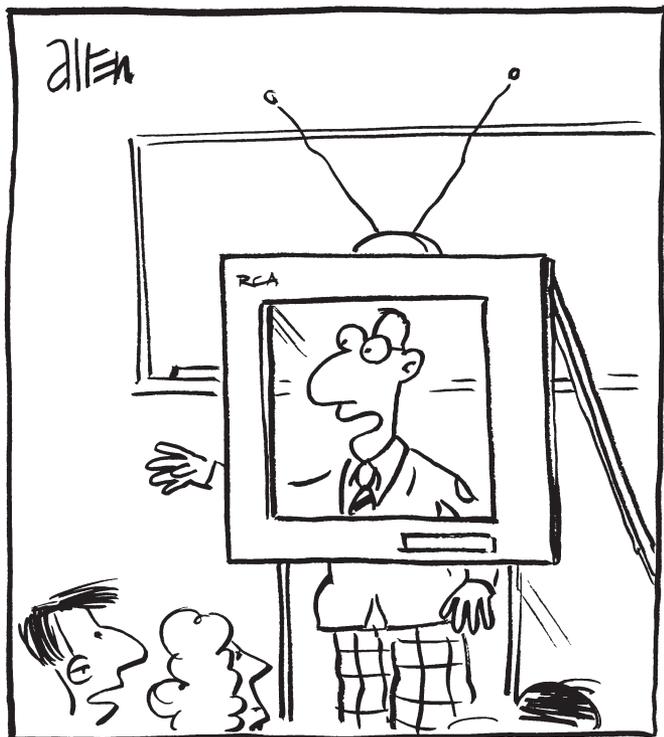
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I don't know what it is but somehow his lectures don't seem so boring

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GET ON THE EDUCATOR MAILING LIST

A new Internet mailing list, for members of the AARC Education Section only, will be pilot-tested over the next several months.

Mark Diana, chair of the Education Section, will moderate the mailing list. At this year's Education Section Business meeting, members of the section indicated an interest in having an Internet mailing list available to them. Diana investigated what options would be available at this point and has teamed up with Steve Nelson, research systems administrator at the Mayo Clinic, to host the list until such time as administration can shift to the AARC offices in Dallas.

Only posts which are germane to the Education Section members' interest will be permitted and posted to the group. Following a pilot period of several months, the administration of the list will move to a new computer or an alternate form of electronic communications will be piloted.

The participants of the Education Section Business meeting indicated that the respiratory care educational community could use such an internet forum to discuss issues related to curriculum content and design and other issues of specific and targeted interest to the respiratory care educational community.

To participate in this list you must:

- 1) have an Internet E-mail address,
- 2) be a member of the AARC and the Education Section
- 3) send a message to: berrier@aarc.org

and request a subscription to the Education Section electronic mailing list.



CONSENSUS CONFERENCE PROCEEDINGS AVAILABLE

The Educational Consensus Conference proceedings are again available from the AARC's Dallas Office. Those publications are: YEAR 2000: Delineating the Educational Direction for the Future Respiratory Care Practitioner; Proceedings of a National Consensus Conference on Respiratory Care Education. October, 1992; and YEAR 2001: An Action Agenda; Proceedings of the Second National Consensus Conference on Respiratory Care Education. October, 1993.

To obtain a copy, please write to the AARC Executive Office, 11030 Ables Lane, Dallas, TX 75229.

AARC ONLINE: A READILY AVAILABLE RESOURCE FOR BUSY EDUCATORS

by William Dubbs, MHA, RRT
AARC Director of Management Services

The content of the AARC World Wide Web site (<http://www.aarc.org>) is expanding weekly and may have the information you need readily available for instant downloading. When you reach the site, click on "AARC Online Services and Information." There you will find the following areas, many of which are of particular interest to educators—

Physician Letter of Support: In October of 1996, the American Society of Anesthesiologists issued this statement in support of respiratory care practitioners versus substitute caregivers. The content of this letter is reproduced here along with instructions on how to obtain a signed copy of the letter on ASA stationery.

Conventions, Meetings, and Seminars: Learn about the AARC International Convention and Exhibition, Affiliate Meeting information, and Special Seminars.

Products and Services: Products and services related to respiratory care, and the *1996 Buyer's Guide of Cardiorespiratory Care Equipment & Supplies*, are available here.

AARC Clinical Practice Guidelines: All 46 of the AARC's Clinical Practice Guidelines are available online.

\$1,000,000 Fund Grant Application: The AARC has established a fund of \$1,000,000 to promote research into the clinical and economic value of respiratory care practitioners. Details on how to apply can be found here.

Links to Other Respiratory Care Related Sites: Links to other sites of interest—

More information for educators can be found in the "Member's Only Section." In this section (members get their unique password through e-mail) you will find—

The AARC Help Line: In this area members can pose their questions or respond to the questions of others. You can review the responses others have made to the questions posted. Some of the questions under discussion this month related to management issues are—

- Extended/advanced practice
- Institutions using TDPs without a respiratory care information system
- Patient assessment skills
- Inpatient pulmonary rehab
- Criteria for discontinuing RC services
- Outsourcing respiratory care in acute care settings
- Charting by exception
- Cardiac rehabilitation
- RCPs as case managers
- Differences in duties (CRTT and RRT)
- Joint Commission experiences
- Therapist-driven protocols
- Respiratory therapists starting IVs

Position Statements: The AARC has advanced a number of position statements and guidelines regarding the provision of services or the practice of respiratory care. These statements are presented here.

CRCE: The AARC approves respiratory care educational programs for CRCE credit, which many states use as the basis of continuing education. A month-by-month listing of the courses approved by the AARC is posted here.

Resources: This is a particularly rich area for educators. Infor-

mation here includes the following—

- **Post-Acute Care Contracting Resource List:** A list of AARC members who are engaged in contracting post-acute care services.
- **Restructuring Resource List:** This is peer counseling network of AARC members who have been involved in hospital restructuring initiatives.
- **Model Transfer Agreement:** This is a sample of a transfer agreement between a hospital and skilled nursing facility.
- **Model Management Agreement:** This is a sample of a respiratory therapy program management agreement between a hospital and a SNF.
- **Overview of the Medicare Program:** A white paper providing a general description of Medicare.

- **Utilization in Respiratory Care:** A white paper describing utilization review in acute and post acute settings.
- **Recentralized Respiratory Care:** A list of organizations that have recently recentralized respiratory care services.

There is much more to come, so I encourage you to check the site frequently. For example, in the near future we will be posting the AARC's JCAHO Cross Walk document. This identifies the 1997 Standards that managers of respiratory care services in acute care facilities should be familiar with when preparing for an accreditation site visit. Also, those who visit our site in the future will be able to quickly determine the current adjusted hourly salary equivalency amounts and standard travel allowances for respiratory care practitioners providing services to residents in skilled nursing facilities covered by Medicare Part A.

1997 LISTING OF ACQUISITIONS EDITORS FOR RESPIRATORY CARE TEXTBOOKS

Editor's Note: The acquisitions editors listed in the table below welcome textbook ideas and proposals from RC educators and practitioners. You are invited to call or write for a copy of the respective submission guidelines. For those interested in contacting an acquisitions editor, see the related article in the summer 1995 issue of the Bulletin: "The Publishing Process: From Concept to Reality"

Publishers	Acquisition Editors
Appleton & Lange Publishers 4 Stamford Plaza, 107 Elm Street P.O. Box 120041 Stamford, CT 06912-0041	Kimberly Davies (800) 451-3794 ext. 4574 FAX (203) 406-4601 kim_davies@prenhall.com
Delmar Publishers 3 Columbia Circle P.O. Box 15015 Albany, NY 12212-5015	Dawn F. Gerrain (518) 464-7022 (800) 998-7498 ext. 7022 FAX (518) 464-0358 dgerrain@delmar.com
F.A. Davis Company 1915 Arch Street Philadelphia, PA 19103	Lynn Borders Caldwell (215) 568-2270 (800) 523-4049 FAX (215) 568-5065 lbc@fadavis.com
Lippincott-Raven Publishers 227 East Washington Square Philadelphia, PA 19106-3780	Lawrence J. McGrew (215) 238-4200
McGraw-Hill Health Professions Division 1221 Avenue of the Americas New York, NY 10020-1095	Joe Hefta (212) 512-3081
Mosby-Year Book 161 N. Clark Suite 1900 Chicago, IL 60601-1080	Jennifer Roche (312) 422-6042 (800) 523-4229 ext. 6042 FAX (312) 726-6075 jennifer.roche@mosby.com
W.B. Saunders Company 85 Marty Street Redlands, CA 92373	Lisa Biello (215) 238-7833 (800) 523-4069
Williams & Wilkins 351 West Camden Street Baltimore, MD 21201-2436	Rhonda Kumm (410) 528-4417 FAX (410) 528-4422

ARCF ANNOUNCES THE AVAILABILITY OF FELLOWSHIPS AND AWARDS

Every year, the ARCF joins with sponsors from industry to award more than \$20,000 to RCPs through its fellowships, awards, and grants program.

Fellowships include—

- **Respiroics Fellowship in Non-Invasive Respiratory Care:** This fellowship is designed to foster projects dealing with non-invasive techniques to provide ventilatory support. Projects can focus on device development, device evaluation, cost-effectiveness analysis, or education programs. Current fellowship funding includes a cash award of \$1,000, plus airfare and one night's lodging to attend the Awards Ceremony at the AARC Convention.
- **Monaghan/Trudell Fellowship for Aerosol Technique Development:** The fellowship is designed to support projects dealing with aerosol delivery issues. Projects may include modeling studies, in-vitro studies, or clinical studies. The focus should be on developing cost-effective approaches to aerosol delivery. Current fellowship funding includes a cash award of \$1,000, plus airfare and one night's lodging to attend the Awards Ceremony at the AARC Convention.
- **Lifecare Fellowship in Mechanical Ventilation:** This fellowship is designed to foster projects dealing with mechanical ventilation, especially outside of the intensive care unit. Projects may include device development, device evaluation, protocol development, cost-effectiveness analysis, or education programs. Current fellowship funding includes a cash award of \$1,000, plus airfare and one night's lodging to attend the Awards Ceremony at the AARC Annual Convention.
- **Glaxo-Wellcome Fellowship for Asthma Education:** This fellowship provides supplementary support for a one-year period to permit fellows to complete a project in asthma education. The purpose of the fellowship is to foster projects that address issues of asthma education, asthma self-management, and asthma awareness. Current fellowship funding includes \$3,500 per year, plus airfare and one night's lodging to attend the Awards Ceremony at the AARC Convention.

Education Recognition Awards include—

All awards include round trip airline tickets, one night's lodging, and registration for the AARC's International Respiratory Congress.

- **Morton B. Duggan, Jr. Memorial Education Recognition Award:** \$1000 awarded in memory of Morton B. Duggan, Jr. Nominees are accepted from all states, with preference given to applicants from Georgia and South Carolina. Includes four night's lodging.
- **Jimmy A. Young Memorial Education Recognition Award:** \$1,000 awarded to a student of minority origin in honor of the late Jimmy A. Young. The Foundation prefers that the nomination be made by the school or program, but any student may initiate a request of sponsorship by the school in order that a deserving candidate is not denied the opportunity to compete simply because the school does not initiate the application.
- **ARCF Education Recognition Award:** \$1,250 awarded

to a second-year student based on academic performance.

- **William F. Miller, MD, Postgraduate Education Recognition Award:** \$1,000 designed to assist qualified respiratory care practitioners in the pursuit of postgraduate training leading to an advanced degree.
- **NBRC/AMP William W. Burgin, Jr., MD, Education Recognition Award:** \$2,500 is awarded to a second-year student who is enrolled in an accredited respiratory therapy program.
- **NBRC/AMP Robert M. Lawrence, MD, Education Recognition Award:** \$2,500 is awarded to a third- or fourth-year student who is enrolled in an accredited respiratory therapy program.

Awards include—

- **The Forrest M. Bird Achievement Award:** This award was established in 1983 to acknowledge outstanding individual scientific contributions in the area of respiratory care of cardiopulmonary disorders and is funded by a \$25,000 endowment from Dr. Forrest M. Bird. The \$2,000 cash award includes an inscribed plaque, plus airfare and one night's lodging to attend the AARC's Annual Convention. Nominations will be accepted until June 30. The recipient will be selected by September 1. For more information, contact the ARCF at 11039 Ables Ln., Dallas, TX 75229, (972) 243-2272.
- **Grants** of up to \$10,000 which are awarded on a periodic basis to individuals and institutions for research projects in the field of respiratory care. Potential projects include: physiology, clinical respiratory care, economics, and education. The purpose of this program is to foster new understandings of the scientific basis of respiratory care and the art of delivering respiratory care.

Note: The American Respiratory Care Foundation (ARCF) recently renamed all Foundation scholarships. They are now designated as Education Recognition Awards. This change will allow re-

RESPIRATORY CARE SEPTEMBER 1997 A SPECIAL EDUCATION ISSUE

We're looking for papers covering ALL aspects of Respiratory Care Education—from teaching patients to use metered dose inhalers to designing curriculum requirements for 2- and 4-year baccalaureate programs, from cross-training and continuing education to post-graduate programs and beyond. Your valuable research, past (unpublished) OPEN FORUM presentations, state-of-the-art reviews, instructional materials reviews, and more are needed.

Because all papers will be submitted for peer-review, the deadline for submission is April 30, 1997! For more information about the Education Issue, contact Kris Williams, Assistant Editor, (972) 406-4665, or e-mail williams@aarc.org.

ipients an opportunity to apply for assistance to agencies which only consider applicants who have not received prior scholarships or grants.



FYI . . .

ProPAC suggests changes in Medicare payments for medical education

The Prospective Payment Assessment Commission's (ProPAC) proposal to freeze Medicare payments to hospitals made quite a stir in the medical community when it was released earlier this year. But the proposal has implications for medical education as well. Buried in the proposal is a recommendation that funding for medical education be cut by nine percent.

Teaching hospitals now receive an average of 7.7% more than non-teaching hospitals from Medicare because they are more expensive to operate. But ProPAC says these hospitals are actually only 4.1% more costly to run than their non-teaching counterparts and wants to correct the discrepancy. The government commission also wants to change the payment mechanism. Instead of paying teaching hospitals about \$70,000 for every resident they train, which is how the system operates now, ProPAC wants to pay these hospitals a flat rate.

The commission says it would soften the blow to teaching hospitals by establishing a separate funding mechanism for medical education that would be supported by funds from the general tax revenues. As of this writing in late January, however, details had yet to be released. (Source: Reuters, 1/23/97)

Advocacy group suggests new tax to fund medical research

Medical education won't be the only thing to suffer if the government decides to cut Medicare payments to teaching hospitals. (See previous story.) Medical research conducted at these institutions will feel the impact as well. A new advocacy group called Citizens for Public Research, however, thinks it has the answer. The government could raise \$4 billion a year for academic programs, it says, through a two percent tax on health premiums. Says founder Dr. James Muller, professor of medicine at the University of Kentucky, "The American public has not been informed about the devastating effects the transition to managed care is having on medical research and teaching." (Source: Reuter, 1/28/97)

Physicians still specializing

Physicians have yet to get the message about primary care, says a new report from the American Medical Association. Statistics show that the number of generalists among the nation's 720,000 doctors actually fell in 1996, down to 38.8% from 39.4% in 1994. The number of American communities that lacked physicians climbed during the same period. In 1994, 149 counties were without a doctor. In 1996 that figure stood at 155. (Source: *Physician Characteristics and Distribution in the U.S.*)

ARCF Announces Helmholtz Research Fund Application Change

In 1994, The National Board for Respiratory Care/Applied Medical Professionals (NBRC/AMP) established an endowment to the American Respiratory Care Foundation (ARCF) to provide support up to \$3,000 for educational or credentialing research, a Master's thesis, or Doctoral dissertation with practical value to the respiratory care profession. This educational research endowment is named for H. Frederic Helmholtz, Jr., MD, in recognition of his outstanding contributions to the respiratory care profession.

The ARCF has approved a more "user-friendly" application that can be submitted at any time during the year. The ARCF trustees feel the new, simplified application is more relevant to education research and is tailored to assist individuals applying for credential-related research grants. The Helmholtz award will include registration, round-trip airfare and one night's lodging to the 1997 AARC International Respiratory Congress in New Orleans, LA.

Applications may be obtained through the ARCF Executive Office at 11030 Ables Ln., Dallas, TX 75229-4593, (972) 243-2272.

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is your voice to the ear
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*The issues that are near and dear
to your heart are valuable
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Your original study, evaluation of a method, device, or protocol, or a case report or case study is important. Submitting it is as easy as calling the editorial office at 972-243-2272 or looking for the 1997 Call for Abstracts in each issue of RESPIRATORY CARE.

Final Deadline: May 27, 1997

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