AARC Times
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Utah Respiratory Bill Signed into Law!

Spit and Polish for an All-new Sputum Bowl 2018

Utah Governor Gary Herbert (center) signed Parker's Bill in April. Pictured (left to right) are: Reid Cowan, Kim Bennion, Dr. Michael Catten, Parker Cowan, Jeffrey Stewart, KC Stewart, Senator Van Tassell, and Yvonne Gardner, Parker Stewart's mother.

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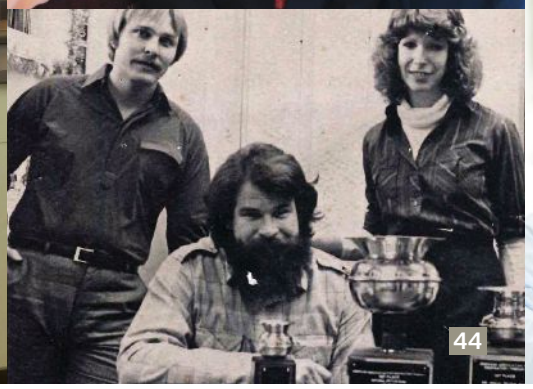

AARC Strategic Plan

The American Association for Respiratory Care has a Strategic Plan that includes its Mission and Vision Statements for 2015–2020.

Bookmark this page: http://www.aarc.org/member_services/mission/.

American Association for Respiratory Care

Editor
Marsha Cathcart, BA

Managing Editor
Douglas Laher, MBA, RRT, FAARC

Contributors
Debbie Bunch, BA

Manager of Marketing and Production
Jeanette Chawdhury, MBA

Graphic Designers
Joyce Havins
Michelle Plumlee, BA

Director of Business Development
Sarah Vaughn, BSRC, RRT

Advertising Rates and Media Information
Contact: phil.ganz@aarc.org
Phil Ganz, 48 Abbey Woods Ln., Suite 100, Dallas, TX 75248
Voice (972) 991-4994
Fax (888) 206-9006

Advertising Materials
Send production materials for AARC publications to advertising@aarc.org or AARC
9425 N. MacArthur Blvd.,
Suite 100
Irving TX 75063
c/o Advertising Department
Voice (972) 243-2272
Fax (972) 484-2720

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Daedalus Enterprises, Inc.
9425 N. MacArthur Blvd.,
Suite 100
Irving, TX 75063
Voice (972) 243-2272
Fax (972) 484-2720

Publisher
Thomas J. Kallstrom, MBA, RRT, FAARC

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Meet the AARC Staff

Thomas J. Kallstrom

Executive Director
kallstrom@aarc.org

Marsha Cathcart

AARC Times Editor
cathcart@aarc.org

Debbie Bunch

Writer
bunch@aarc.org

Richard Hernandez

Shipping Manager
richard.hernandez@aarc.org

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Practice Makes...Survival More Likely

by Anthony L. DeWitt, JD, RRT, FAARC

Health care workers, more than any other, understand the consequences of gun violence. They see the wounded victims; they try to save them. Often, they fail despite their best efforts. Usually, even if there is a recovery, it is a partial recovery. Body parts that used to work simply don't work the way they used to, and perhaps that's why there has been such an outcry over Bruce Willis' most recent film, in which he plays a physician who takes the law into his own hands. Health care workers save lives, they don't take them.

Except when they do.

Dr. Henry Bello, who had resigned from a Bronx hospital in 2015 after he allegedly committed sexual harassment, blamed hospital staff there for his trouble. He legally bought a gun about a week before his rampage. On June 30, 2017, he entered the hospital and set the nurses' station on fire. Before he took his own life, he claimed numerous lives and inflicted horrific injuries. As a result, at least one of the victims has filed suit against the hospital.

It is worth noting that Dr. Bello was belligerent only toward hospital staff. That is not always the case. Sometimes when people come to hospitals, they come with the idea of finishing a job started on the street or at home.

In September, 49-year-old Travis Frink shot and killed his mother, 70-year-old Pamela Ferriere, while she was staying in the intensive care unit at Dartmouth-Hitchcock Hospital. He was caught by police trying to escape the hospital. In January, a 46-year-old patient at Barnes-Jewish Hospital in St. Louis, who was in a treatment room with his wife, emerged from his room on the 14th floor and pulled two knives out of his pockets. Two security guards arrived at the scene and immediately ordered the man to drop the weapons. When he refused, both officers fired multiple shots. He died at the scene.

No matter where you work, no matter what your job entails, there is a strong possibility that violence could affect your workplace. Are you ready? Have you practiced?

One of the first things that happens in any hospital when you go through orientation is you learn about fire safety. You are taught what to do to protect patients in a fire, where oxygen shut-off valves are. When I was a manager, we drilled these techniques. One therapist became a hero when he shut off the oxygen supply in a construction-related fire that might have otherwise become a late-night disaster. He knew how to do it, and where to do it, because he practiced.

Knowing when and how to employ life-saving techniques develops with repetition and practice. That's why we practice perishable skills, and why advanced cardiovascular life support certification requires recertification. Practice doesn't always make perfect, but it makes perfect more likely.

It is worth pointing out that workplace shootings are very stressful events for everyone, and particularly for employees who must adapt to life-threatening situations rapidly. Neuroscience tells us that in stressful situations, when the body is producing stress hormones, preparation beforehand reduces the length of time necessary for reaction to stimuli. The brain is a multi-channel, limited-capacity signal processor that has built-in temporal constraints that affect its ability to operate in real time.

about the author...

Anthony L. DeWitt, JD, RRT, FAARC, is an attorney and a partner in the firm Bartimus, Frickleton, and Robertson, PC, and resides in Opelika, AL. He has also published two books and numerous legal journal articles. This article is not a substitute for legal advice.

Operational information (the reaction to a particular event or situation) is processed in working memory, which has two important limitations: It can hold only so much information at any given time, and it can process information no faster than its given maximum rate.

For this reason, higher-order human cognition under optimal conditions requires a minimum of 8–10 seconds for completion. The more complex the cognitive task — e.g., formulating an escape plan based on a surprise attack — the more expansive the brain function required to respond, and the more likely that it will take longer to react. Studies of survivors who escaped maritime and aircraft disasters show that during an emergency, there is not just a "fight or flight" response, there is a "fight, flight, or freeze" response.[1] People who die in these emergencies tend to freeze. That is why the first thing any cruise ship passenger is taught is what to do when the alarm sounds. This is also why every time you fly, you hear the same announcements. If you know what to do, it reduces your reaction time.

The brain is organized such that response time can be improved through practice, training, and experience in anticipation of a serious event. Such preparation involves converting complex operations (which take 8–10 seconds) into simple operations (which take only 1–2 seconds). This is why preparation and practice are vital to successful outcomes, both in health care and in survival situations.

While some hospitals like Dartmouth-Hitchcock have laudably increased their security, others have taken very little action toward securing their perimeter. There are pros and cons on both sides. A hospital should not be an armed camp, but neither should it be a place where someone is free to come in shooting.

Regardless of whether a hospital has armed security or a history of workplace violence, every hospital should have a code (perhaps a Code Orange) for an active shooter, and every employee should practice what to do in this situation. This is important because health care workers must not only protect themselves, they must protect their patients. Both workers and patients should be secured behind heavy doors that can be locked from the inside (and only unlocked from the outside by persons with the proper key).

It is beyond the scope of this article to recommend specifics, but this is a conversation that needs to happen in *every* hospital. Administrators need to take the lead. Local police and security consultants can offer advice on how to protect staff, visitors, and patients in an active-shooter situation. But merely having a plan is not good enough if you do not conduct drills and practice the skills. Practice, not merely having the plan, is what makes the life-saving difference. ■

Reference

1. Seltzer LF. Trauma and the freeze response: good, bad, or both? Psychology Today website. Available at: https://www.psychologytoday.com/blog/evolution-the-self/201507/trauma-and-the-freeze-response-good-bad-or-both *Accessed May 7, 2018.*

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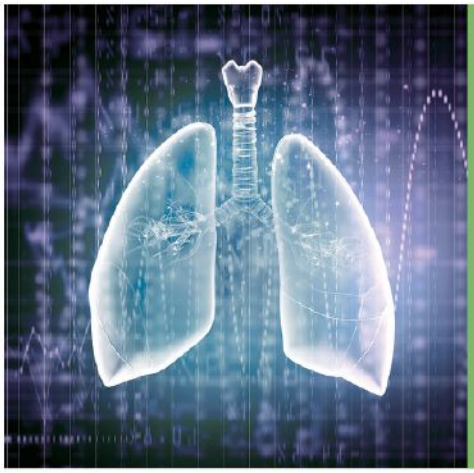

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Seeing Respiratory Care from a Different Perspective

by Thomas J. Kallstrom, MBA, RRT, FAARC

I have been a respiratory therapist all of my working life, which dates back to the 1970s. In my clinical days, I always tried to care for my patients with the compassion and care that would be expected from any competent respiratory therapist. But I only saw that from my perspective, not from the patient's. Well, that changed for me a few days ago.

I'd had a sore throat for several days, and then I noticed that it seemed to hurt more than the usual garden-variety sore throat. I decided to drive up to the urgent care — or, as some call it, the "doc in a box" — for attention. Interestingly, while they did not seem to be too busy, they rushed me through without asking the key questions about my condition or history. They never took a temperature and only did a culture without even a cursory look at my throat. After a steroid shot and a prescription, I was summarily released with a prescription for an antibiotic and was told I had a sinus infection.

As the day went on, I found that, when I turned my head left or right, I was not moving air. How odd for a sinus infection. By the time I could only mutter three-word sentences, I decided to drive my diaphoretic self to a small, local, hospital emergency room. It was immediately recognized that this was a situation of imminent total airway loss. After some failed albuterol treatments and racemic epis, I was down for the count and was prepared for intubation. The respiratory therapists who attended to me were great — before I was intubated, I asked whether they were members of the AARC, which they were (got to get those members any which way you can).

After intubation, I was transferred to another hospital that was better equipped to manage me. During the ride over, I was in and out of consciousness, but I do recall seeing a bright white light, hoping it was just a headlight (weird, though, as my eyes were closed), and then I blacked out. When I woke up, I found that I had been extubated. This was my first surprise, as I always assumed that when you are extubated you are awake and aware. The second surprise was learning that I had been intubated and ventilated for about 12 hours. It makes me wonder how many patients experience extubation like this. I do not recall any weaning done at all. In fact, first thing I remember is opening my eyes and seeing my wife and daughter standing at my bedside.

Spending a day in a critical care ICU in a tertiary hospital was another unexpected experience. There is no such thing as rest or sleep, and the constant alarms in my private room were unending. I finally figured out there was something I could do as I noticed that I was desaturating due to decreased respiratory effort and some residual obstruction of my airway. I asked for a respiratory therapist to bring in a CPAP. We worked on a setting that worked for me and relief finally came. I was on the mend.

The clinical staff and the professional demeanor of all who cared for me was impressive. The only disappointment was a comment that came from someone on staff who, when I asked for the respiratory therapist on the night shift, commented, "Well, he's probably hiding, like he always does." Now that was a bummer to hear, but sadly, perception is reality with many. Turned out, this particular RT was not on duty, but it saddened me to hear such a comment. Our weaker performers often define us as a profession, and that perception hurts us all tremendously. We really need to fix that.

about the author…

Thomas J. Kallstrom, MBA, RRT, FAARC, is executive director of the AARC.

Here are some lessons that I learned during this trying weekend:

- Always pay attention to your body signals, and get attention before it is too late (do not be a cowboy, even in Texas).
- Understand that the people who are caring for you are doing their best and often under less than desirable circumstances.
- Be a part of your care or your loved one's care when you can. As a respiratory therapist, you have immense knowledge that should be put to good use.
- Be patient and respectful of the clinicians who care for you.
- Make sure that, as a respiratory therapist, you garner respect and that you're not the one who is looked upon as "not a team player."

It turned out that I had an acute episode of epiglottis from a blood infection I had acquired. Had I not acted as quickly as I did, I likely would not be alive. I plan to never let this happen again, but I did learn a lot the hard way about what it's like to be on the other end of the endotracheal tube. ■

IMPORTANT SAFETY INFORMATION

LONHALA MAGNAIR is contraindicated in patients with a hypersensitivity to glycopyrrolate or to any of the ingredients.

LONHALA MAGNAIR should not be initiated in patients with acutely deteriorating or potentially life-threatening episodes of COPD or used as rescue therapy for acute episodes of bronchospasm. Acute symptoms should be treated with an inhaled short-acting beta$_2$-agonist.

As with other inhaled medicines, LONHALA MAGNAIR can produce paradoxical bronchospasm that may be life-threatening. If paradoxical bronchospasm occurs following dosing with LONHALA MAGNAIR, it should be treated immediately with an inhaled, short-acting bronchodilator; LONHALA MAGNAIR should be discontinued immediately and alternative therapy instituted.

Immediate hypersensitivity reactions have been reported with LONHALA MAGNAIR. If signs occur, discontinue LONHALA MAGNAIR immediately and institute alternative therapy.

LONHALA MAGNAIR should be used with caution in patients with narrow-angle glaucoma and in patients with urinary retention. Prescribers and patients should be alert for signs and symptoms of acute narrow-angle glaucoma (e.g., eye pain or discomfort, blurred vision, visual halos or colored images in association with red eyes from conjunctival congestion and corneal edema) and of urinary retention (e.g., difficulty passing urine, painful urination), especially in patients with prostatic hyperplasia or bladder-neck obstruction. Patients should be instructed to consult a physician immediately should any of these signs or symptoms develop.

The most common adverse events reported in ≥2% of patients taking LONHALA MAGNAIR, and occurring more frequently than in patients taking placebo, were dyspnea (4.9% vs 3.0%) and urinary tract infection (2.1% vs 1.4%).

LONHALA solution is for oral inhalation only and should not be injected or swallowed. LONHALA vials should only be administered with MAGNAIR.

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*Improper cleaning and maintenance may increase administration time.
†Patients breathe naturally through the mouthpiece when taking treatment.
‡When the administration cycle is completed, the user will hear 2 beeps, the green LED light will turn off, and the controller will automatically shut off.
§Handset is 2.4 x 4.7 inches. Controller is 1.6 x 4.6 inches. MAGNAIR™ Nebulizer System weighs 10.2 ounces (including batteries).
COPD=chronic obstructive pulmonary disease; LAMA=long-acting muscarinic antagonist.

INDICATION

LONHALA™ MAGNAIR™ (glycopyrrolate) is an anticholinergic indicated for the long-term maintenance treatment of airflow obstruction in patients with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and/or emphysema.

Assembly required.

You are encouraged to report negative side effects of prescription drugs to the FDA. Visit www.fda.gov/medwatch or call 1-800-FDA-1088.

References: 1. LONHALA MAGNAIR [prescribing information]. Marlborough, MA: Sunovion Pharmaceuticals Inc.; 2018. **2.** Data on file. PARI. Test report: loudness measurement eLete. November 30, 2017. **3.** LONHALA MAGNAIR [instructions for use]. Marlborough, MA: Sunovion Pharmaceuticals Inc.; 2017.

For additional information, please see the Brief Summary of Prescribing Information on the following page. Please see full Prescribing Information and Patient Information for LONHALA MAGNAIR at www.sunovionprofile.com/lonhala-magnair.

Lonhala™ Magnair™
(glycopyrrolate) Inhalation Solution
25 mcg/1 mL

Lonhala™ Magnair™

(glycopyrrolate) Inhalation Solution

For oral inhalation use

BRIEF SUMMARY OF FULL PRESCRIBING INFORMATION

Please see package insert for full Prescribing Information, including Patient Information.

INDICATIONS AND USAGE

LONHALA™ MAGNAIR™ is an anticholinergic indicated for the long-term maintenance treatment of airflow obstruction in patients with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and/or emphysema.

CONTRAINDICATIONS

LONHALA MAGNAIR is contraindicated in patients with a hypersensitivity to glycopyrrolate or any of the ingredients.

WARNINGS AND PRECAUTIONS

Deterioration of Disease and Acute Episodes

LONHALA MAGNAIR should not be initiated in patients during acutely deteriorating or potentially life-threatening episodes of COPD. LONHALA MAGNAIR has not been studied in subjects with acutely deteriorating COPD. The initiation of LONHALA MAGNAIR in this setting is not appropriate.

LONHALA MAGNAIR should not be used as rescue therapy for the treatment of acute episodes of bronchospasm. LONHALA MAGNAIR has not been studied in the relief of acute symptoms and extra doses should not be used for that purpose. Acute symptoms should be treated with an inhaled, short-acting $beta_2$-agonist.

COPD may deteriorate acutely over a period of hours or chronically over several days or longer. If LONHALA MAGNAIR no longer controls symptoms of bronchoconstriction the patient's inhaled, short-acting $beta_2$-agonist becomes less effective; or the patient needs more inhalations of a short-acting $beta_2$-agonist than usual, these may be markers of deterioration of disease. In this setting, a re-evaluation of the patient and the COPD treatment regimen should be undertaken at once. Increasing the daily dose of LONHALA MAGNAIR beyond the recommended dose is not appropriate in this situation.

Paradoxical Bronchospasm

As with other inhaled medicines, LONHALA MAGNAIR can produce paradoxical bronchospasm that may be life-threatening. If paradoxical bronchospasm occurs following dosing with LONHALA MAGNAIR, it should be treated immediately with an inhaled, short-acting bronchodilator; LONHALA MAGNAIR should be discontinued immediately, and alternative therapy instituted.

Immediate Hypersensitivity Reactions

Immediate hypersensitivity reactions may occur after administration of LONHALA MAGNAIR. If signs suggesting allergic reactions occur, in particular, angioedema (including difficulties in breathing or swallowing, swelling of the tongue, lips, and face), urticaria, or skin rash, LONHALA MAGNAIR should be discontinued immediately and alternative therapy instituted.

Worsening of Narrow-Angle Glaucoma

LONHALA MAGNAIR should be used with caution in patients with narrow-angle glaucoma. Prescribers and patients should be alert for signs and symptoms of acute narrow-angle glaucoma (e.g., eye pain or discomfort, blurred vision, visual halos or colored images in association with red eyes from conjunctival congestion and corneal edema). Instruct patients to consult a physician immediately should any of these signs or symptoms develop.

Worsening of Urinary Retention

LONHALA MAGNAIR should be used with caution in patients with urinary retention. Prescribers and patients should be alert for signs and symptoms of urinary retention (e.g., difficulty passing urine, painful urination), especially in patients with prostatic hyperplasia or bladder-neck obstruction. Instruct patients to consult a physician immediately should any of these signs or symptoms develop.

ADVERSE REACTIONS

Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The LONHALA MAGNAIR safety database included 2379 subjects with COPD in two 12-week efficacy studies and one 48-week long-term safety study. A total of 431 subjects received treatment with LONHALA MAGNAIR 25 mcg twice-daily (BID). The safety data described below are based on the two 12-week trials and the one 48-week trial.

12-Week Trials

LONHALA MAGNAIR was studied in two 12-week placebo-controlled trials in 431 subjects with COPD, treated with LONHALA MAGNAIR at the recommended dose of 25 mcg, twice daily. The population had a mean age of 63 years (ranging from 40 to 87 years), with 56% males, 90% Caucasian, and a mean post-bronchodilator forced expiratory volume in one second (FEV_1) percent predicted of 52% of predicted normal value (20%-80%) at study entry. The study population also included subjects with pre-existing cardiovascular disease as well as subjects with continued use of stable long-acting bronchodilator (LABA) +/- inhaled corticosteroid (ICS) and ipratropium bromide background therapy. Subjects with unstable cardiac disease, narrow-angle glaucoma, or symptomatic prostatic hypertrophy or bladder outlet obstruction were excluded from these studies.

The proportion of subjects who discontinued treatment due to adverse reactions was 5% for the LONHALA MAGNAIR-treated subjects and 9% for placebo-treated subjects.

Table 1: Adverse Reactions with LONHALA MAGNAIR ≥ 2.0% Incidence and Higher than Placebo

	Placebo (N=430) N (%)	LONHALA MAGNAIR 25 mcg BID (N=431) N (%)
Dyspnea	13 (3.0)	21 (4.9)
Urinary Tract Infection	6 (1.4)	9 (2.1)

Other adverse reactions defined as events with an incidence of ≥ 1.0% but less than 2.0% with LONHALA MAGNAIR but more common than with placebo included the following: wheezing, upper respiratory tract infection, nasopharyngitis, oedema peripheral, and fatigue.

48-Week Trial

In a long-term open-label safety trial, 1086 subjects were treated for up to 48 weeks with LONHALA MAGNAIR 50 mcg twice-daily (N=620) or tiotropium (N=466). The demographic and baseline characteristics of the long-term safety trial were similar to those of the placebo-controlled efficacy studies described above. The adverse reactions reported in the long-term safety trial were consistent with those observed in the placebo-controlled studies of 12 weeks. Adverse reactions that occurred at a frequency greater than that seen in either active treatment dose in the pooled 12-week placebo controlled studies and ≥ 2.0% were: diarrhea, edema peripheral, bronchitis, nasopharyngitis, pneumonia, sinusitis, upper respiratory tract infection, urinary tract infection, back pain, headache, Chronic Obstructive Pulmonary Disease, cough, dyspnea, oropharyngeal pain, and hypertension.

DRUG INTERACTIONS

Anticholinergics

There is a potential for an additive interaction with concomitantly used anticholinergic medications. Therefore, avoid unnecessary co-administration of LONHALA MAGNAIR with other anticholinergic-containing drugs as this may lead to an increase in anticholinergic effects.

USE IN SPECIFIC POPULATIONS

Pregnancy

Risk Summary

There are no adequate and well-controlled studies in pregnant women. LONHALA MAGNAIR should only be used during pregnancy if the expected benefit to the patient outweighs the potential risk to the fetus. Women should be advised to contact their physician if they become pregnant while taking LONHALA MAGNAIR. In animal reproduction studies, there were no teratogenic effects in Wistar rats and New Zealand White rabbits at inhaled doses approximating 1521 and 580 times, respectively, the maximum recommended human daily inhalation dose (MRHDID) based on an AUC comparison.

The estimated background risk of major birth defects and miscarriage for the indicated population is unknown. In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2-4% and 15-20%, respectively.

Labor or Delivery

The potential effect of LONHALA MAGNAIR on labor and delivery is unknown. LONHALA MAGNAIR should be used during labor and delivery only if the potential benefit to the patient justifies the potential risk to the fetus.

Animal Data

Developmental studies in Wistar rats and New Zealand White rabbits in which glycopyrrolate was administered by inhalation during the period of organogenesis did not result in evidence of teratogenicity at exposures approximately 1521 and 580 times, respectively, the MRHDID of LONHALA MAGNAIR based on a comparison of plasma AUC levels (maternal doses up to 3.8 mg/kg/day in rats and 4.4 mg/kg/day in rabbits). Glycopyrrolate had no effects on peri-natal and post-natal development in rats following subcutaneous exposure of approximately 1137 times the MRHDID of LONHALA MAGNAIR based on an AUC comparison (at a maternal dose of up to 1.885 mg/kg/day).

Lactation

Risk Summary

There are no data on the presence of glycopyrrolate or its metabolites in human milk, the effects on the breastfed infant, or the effects on milk production. However, in a study of lactating rats, glycopyrrolate was present in the milk. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for LONHALA MAGNAIR and any potential adverse effects on the breastfed infant from LONHALA MAGNAIR or from the underlying maternal condition.

Data

Glycopyrrolate (and its metabolites) was detected in the milk of lactating rats following a single intravenous injection of 4 mg/kg of radiolabeled glycopyrrolate.

Pediatric Use

LONHALA MAGNAIR is not indicated for use in children. The safety and efficacy of LONHALA MAGNAIR in pediatric patients have not been established.

Geriatric Use

Based on available data, no adjustment of the dosage of LONHALA MAGNAIR in geriatric patients is warranted. LONHALA MAGNAIR can be used at the recommended dose in elderly patients 75 years of age and older.

Of the total number of subjects in clinical studies of LONHALA MAGNAIR, 41% were aged 65 and older, while 8% were aged 75 and older. No overall differences in safety or effectiveness were observed between these subjects and younger subjects, and other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out.

Renal Impairment

No dose adjustment is required for patients with mild and moderate renal impairment. The effects of renal impairment on the pharmacokinetics of glycopyrrolate have not been studied.

Hepatic Impairment

No dose adjustment is required for patients with hepatic impairment. The effects of hepatic impairment on the pharmacokinetics of glycopyrrolate have not been studied.

OVERDOSAGE

An overdose of glycopyrrolate may lead to anticholinergic signs and symptoms such as nausea, vomiting, dizziness, lightheadedness, blurred vision, increased intraocular pressure (causing pain, vision disturbances, or reddening of the eye), obstipation or difficulties in voiding.

In COPD patients, orally inhaled administration of LONHALA MAGNAIR at a total daily dose of 200 mcg for 28 consecutive days (maximum of 1 mg) was well tolerated.

PATIENT COUNSELING INFORMATION

Advise the patient to read the FDA-approved patient labeling (Patient Information and Instructions for Use).

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Ventilation for Life

Applying the Concepts of Lung Stress and Strain at the Bedside

by William M. LeTourneau II, MA, RRT, RRT-ACCS

Lung-protective ventilation is a topic of intense interest, and the determination of optimal protection continues to challenge researchers and clinicians. The role of low tidal volume (V_T) ventilation and the management of plateau pressure (P_{plat}) was well defined in the ARDSnet Trial published over 15 years ago.[1] Although the ARDSnet Trial was a practice-changing event, it was not the first suggestion of the protective effects of low V_T ventilation. In 1988, Dreyfuss and colleagues persuasively demonstrated that high volume ventilation, independent of airway pressure, contributed to excessive pulmonary edema and alveolar flooding.[2] This protracted time span between discovery and the consensus of application demonstrates the complicated nature of lung-protective ventilation and the lack of agreement as to the true cause of lung injury.

The debate continues regarding the cause and the ability to attenuate ventilator-induced lung injury. The central question remains: Is the injury caused by excessive volume or by applied pressures? The obvious answer is that both contribute to lung injury, and both should be considered to minimize the chance of ventilator-induced lung injury. Maintaining low V_T ventilation and acceptable P_{plat} values have shown survival benefit in patients with ARDS, but other ventilation parameters that more accurately assess the structural challenges applied to the lung have been identified.[1,3]

When the application of positive-pressure ventilation is required, the concepts of lung stress and lung strain may better describe the actual potential for lung injury. The descriptions of lung stress and strain have been extensively published and quantified in the literature, but the concepts have a poor translation to the bedside, and the benefits of their use remain elusive. To fully understand the bedside application to the lung stress and lung strain concepts, we need to have a clear understanding of what is being measured.

In general, stress refers to the internal force per unit area that balances an external load, while strain refers to the deformation of an object relative to its resting size.[4] In the context of the ventilation, lung stress is the pressure applied to the alveoli to balance the elastic pressure generated by the physical structure of the lung, while lung strain represents the volume delivered compared to the structure's ability to accept a specific volume. Before describing lung stress and lung strain further, it is appropriate to discuss the concepts that are required to appreciate the importance of monitoring lung stress and lung strain: the "baby lung" concept, transpulmonary pressure, and driving pressure.

about the author...

William M. LeTourneau II, MA, RRT, RRT-ACCS is an instructor in anesthesiology at the Mayo Clinic College of Medicine and a faculty instructor of respiratory therapy at the Mayo Clinic School of Health Sciences in Rochester, MN.

The "baby lung" concept

Similar to low V_T ventilation, the "baby lung" concept is not new to research and has evolved into a fundamental idea of lung sizing and V_T delivery in patients with ARDS.[5] A basic definition of the "baby lung" is the fraction of lung parenchyma open at end-expiration. Lung size, compliance, and the position of the baby lung are important factors to consider. First, the size of the "baby lung" increase with recruitment maneuvers and alveolar stabilization. Second, the "baby lung" is not necessarily a stiff lung; rather it is a small lung and the compliance of the aerated lung may be normal. Finally, the "baby lung" is not in a fixed position within the lung; it may move with changes in size and alteration in the gravity-dependent regions of the lung. Appreciating the concept of the "baby lung" leads to the practice of sizing delivered V_T to ideal body weight. The lungs of patients with

ARDS and matching ideal body weight and delivered V_T may experience very different physical challenges based on the size of the "baby lung." Subsequently, setting V_T to available lung tissue is a more physiological lung-protective strategy than simply using ideal body weight. The idea of setting V_T to lung size sounds complicated, and it does require specific mechanical ventilator performance capabilities, but the idea can be brought to the bedside by using the concepts of lung stress and lung strain.

Transpulmonary pressure

Transpulmonary pressure (P_L) is the pressure across the lung that gives rise to pulmonary ventilation.[9] More simply defined, it is the difference between the pressure applied to the airway opening (P_{ao}) and the pressure in the pleural space (P_{pl}) ($P_L = P_{ao} - P_{pl}$).[4] Interest in transpulmonary pressure has increased over the past several years; this is secondary to esophageal monitoring capabilities on a number of ventilators. Clinically determining transpulmonary pressure requires a surrogate for pleural pressure, which is accomplished through esophageal manometry. With this reliance on esophageal manometry, several assumptions related to the uniformity of pleural pressures must be made, and these assumptions may result in potential interventional errors. Beyond the potential for errors, transpulmonary pressure has the prospect of being a physiologically specific tool. It has been demonstrated to be a PEEP-adjustment tool in the setting of acute lung injury and respiratory failure.[11,12] This application demonstrates the physiologic value of transpulmonary pressure compared to other recruitment maneuvers; however, the superiority of transpulmonary pressure over other techniques of alveolar stabilization have not been established. Along with the use of expiratory transpulmonary pressure to determine PEEP, monitoring inspiratory transpulmonary pressure is significant in the description and interpretation of lung stress.

Driving pressure

As a general rule, the appropriate setting of PEEP and the monitoring of V_T and P_{plat} are lung protective. It is unclear, however, to what degree any individual setting or parameter contributes to survival rate. A recent review of previously reported randomized trials attempted to determine if driving pressure (ΔP) — the ratio of V_T to compliance of the respiratory system ($\Delta P = V_T/C_{RS}$) — was a more accurate survival index than the V_T or PEEP setting alone.[6] The study concluded that individual changes in V_T or PEEP were not independently associated with survival, but they were associated with survival if the change led to reductions in ΔP. The calculation of ΔP includes the variables of V_T, PEEP, and P_{plat}. The formula $\Delta P = V_T/C_{RS}$ suggests that ΔP is an index that represents V_T delivery as well as the ability of the structure to accept the volume. A more clinically efficient manner of determining ΔP is to use this formula: $\Delta P = P_{plat} - PEEP$.

The suggestion of the use of ΔP as a surrogate for dynamic lung strain during mechanical ventilation is not without merit, but it should be stated that identifying true strain of the lung in the clinical setting may be elusive at best.[4] In the absence of a consensus agreement on how to efficiently measure lung strain, however, ΔP is a viable option to represent the pressure load required of tidal ventilation, keeping in mind that ΔP may not increase with additional PEEP secondary to lung tissue recruitment or may not result in unreasonable strain being applied to the lung.[7,8]

Lung stress

A technical definition of lung stress describes it as reflecting the net distending pressure applied to the lung parenchyma, opposed by the elastic pressures generated by alveolar surface tension and the lung structure.[10] Or we can turn to the simplified definition that describes lung stress as pressure applied to the alveoli, opposed by the elastic pressure generated by the physical structure of the lung. Regardless of the definition, it is closely related to transpulmonary pressure. We can calculate lung stress by measuring airway pressure (P_{plat} or PEEP) and comparing it to pleural pressure, using esophageal manometry as the surrogate. The lung stress concept simply compares the pressure inside the lung to pressure outside the lung. A small difference generates less stress, while a large difference generates more stress.

A simplified model suggests using P_{plat} as a rough surrogate for lung stress. With the addition of esophageal manometry, transpulmonary pressure can be used as the surrogate for lung stress. This may be a more physiologic representation of global stress. A safe stress limit has been suggested to be an end-inspiratory transpulmonary pressure of ≤20–25 cm H_2O and an end-expiratory transpulmonary pressure of 0–5 cm H_2O.[11,12]

Lung strain

We can describe lung strain as the ratio of delivered V_T to the functional residual capacity (V_T/FRC).[13] For the bedside application, lung strain can be simply described as delivered V_T compared to the structure's ability to accept a volume, or C_{RS} (V_T/C_{RS}).

The measurement of FRC has clinical limitations secondary to the limited number of ventilators that offer a

software package to estimate FRC. Evidence from an animal model suggests that the harmful limit of dynamic strain is approximately 2 (e.g., if V_T = 500 mL and FRC = 250 mL, then V_T/FRC = 2), and a strain level >2 may not have a safe mechanical ventilation threshold and may be an indicator for the addition of extracorporeal support.[14,15] If we use the simplified definition of lung strain as volume delivered compared to the structure's ability to accept volume, we can consider using $\Delta P = V_T/C_{RS}$ as a surrogate for lung strain. Obtaining ΔP measurements at the bedside only requires PEEP and P_{plat} measurements ($\Delta P = P_{plat} - PEEP$). When adjustments in PEEP are made, changes in lung strain may be identified from a resulting change in ΔP. A safe limit of 14–15 cm H_2O has been established for ΔP because mortality significantly increases above this limit.[6-8]

Conclusion

The application of mechanical ventilation in the setting of respiratory failure can be a necessary and a potentially life-saving intervention. Unfortunately, unseen factors can affect alveolar stability and the lungs' ability to accept normal tidal ventilation. Without careful monitoring and purposeful actions to limit the negative consequences of these unseen factors, we may compromise a primary goal of mechanical ventilation: Do no harm. By understanding the concepts of lung stress and lung strain and by being able to apply these concepts at the bedside, we can provide additional layers to lung-protective ventilation for our patients. While the concepts of lung stress and lung strain are simply a foundation for clinician knowledge and have a number of physiological and applicable limitations to their use, they are relatively accessible and measurable tools to assist the bedside provider in critical decision making regarding mechanical-ventilation management. ■

References

1. Acute Respiratory Distress Syndrome Network, Brower RG, Matthay MA, et al. Ventilation with lower tidal volumes as compared with traditional tidal volumes for acute lung injury and the acute respiratory distress syndrome. N Engl J Med 2000;342(18):1301–1308.
2. Dreyfuss D, Soler P, Basset G, Saumon G. High inflation pressure pulmonary edema. Retrospective effects of high airway pressure, high tidal volume, and positive end-expiratory pressure. Am Rev Respir Dis 1988;137:1159–1164.
3. Needham DM, Yang T, Dinglas VD, et al. Timing of low tidal volume ventilation and intensive care unit mortality in acute respiratory distress syndrome. A prospective cohort study. Am J Respir Crit Care Med 2015;191(2):177–185.
4. Guerin C, Moss M, Talmor D. A glossary of ARDS for beginners. Intensive Care Med 2016;42:659–662.
5. Gattinoni L, Pesenti A. ARDS: the non-homogeneous lung; facts and hypothesis. Intensive Crit Care Dig 1987;6:1–4.
6. Amato MB, Meade MO, Slutsky AS, et al. Driving pressure and survival in the acute respiratory distress syndrome. N Engl J Med 2015;372(8):747–755.
7. Grieco DL, Chen L, Dres M, Brochard L. Should we use driving pressure to set tidal volume? Curr Opin Crit Care 2017;23:38–44.
8. Chiumello D, Carlesso E, Brioni M, Cressoni M. Airway driving pressure and lung stress in ARDS patients. Critical Care 2016;20:276
9. Loring SH, Topulos GP, Hubmayr RD. Transpulmonary pressure: the importance of precise definitions and limiting assumptions. Am J Respir Crit Care Med 2016;194(12):1452–1457.
10. Henderson WR, Chen L, Amato MB, Brochard L. Fifty years of research in ARDS. Respiratory mechanics in acute respiratory distress syndrome. Am J Respir Crit Care Med 2017;196(7):822–833.
11. Talmor D, Sarge T, Malhotra A, et al. Mechanical ventilation guided by esophageal pressure in acute lung injury. N Engl J Med 2008;359(20):2095–2104.
12. Mauri T, Yoshida T, Bellani G, et al. Esophageal and transpulmonary pressure in the clinical setting: meaning, usefulness and perspectives. Intensive Care Med 2016;42:1360–1373.
13. Blankman P, Hasan D, Bikker IG, Gommer D. Lung stress and strain calculations in mechanically ventilated patients in the intensive care unit. Acta Anaesthesiologica Scandinavica 2016;60:69–78.
14. Chiumello D, Carlesso E, Cadringher P, et al. Lung stress and strain during mechanical ventilation for acute respiratory distress syndrome. Am J Respir Crit Care Med 2008;178(4):346–355.
15. Protti A, Cressoni M, Santini A, et al. Lung stress and strain during mechanical ventilation. Any safe threshold? Am J Respir Crit Care Med 2011;183(10):1354–1362.

For patients with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and/or emphysema

SUCCESS

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audiovisual feedback each time a dose is inhaled

INDICATION

SEEBRI™ NEOHALER® (glycopyrrolate) is an anticholinergic indicated for the long-term, maintenance treatment of airflow obstruction in patients with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and/or emphysema.

IMPORTANT SAFETY INFORMATION

SEEBRI NEOHALER is contraindicated in patients with a hypersensitivity to glycopyrrolate or to any of the ingredients.

SEEBRI NEOHALER should not be initiated in patients with acutely deteriorating or potentially life-threatening episodes of COPD or used as rescue therapy for acute episodes of bronchospasm. Acute symptoms should be treated with an inhaled short-acting beta$_2$-agonist.

As with other inhaled medicines, SEEBRI NEOHALER can produce paradoxical bronchospasm that may be life threatening. If paradoxical bronchospasm occurs following dosing with SEEBRI NEOHALER, it should be treated immediately with an inhaled, short-acting bronchodilator; SEEBRI NEOHALER should be discontinued immediately and alternative therapy instituted.

Immediate hypersensitivity reactions have been reported with SEEBRI NEOHALER. If signs occur, discontinue immediately and institute alternative therapy. SEEBRI NEOHALER should be used with caution in patients with severe hypersensitivity to milk proteins.

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Improved symptom control all day and night with twice-daily SEEBRI™ NEOHALER® (glycopyrrolate)

- **>120 mL improvement in FEV_1 $AUC_{0\text{-}12hr}$ vs placebo at Week 12 in two trials (primary end point)**[1]
  - 139 mL improvement in FEV_1 $AUC_{0\text{-}12hr}$ vs placebo at Week 12 in Trial 1
  - 123 mL improvement in FEV_1 $AUC_{0\text{-}12hr}$ vs placebo at Week 12 in Trial 2
- **Reduction in rescue medication use all day and night with twice-daily SEEBRI NEOHALER vs placebo (secondary end point)**[1,2]
  - SEEBRI NEOHALER is not a rescue inhaler and is not indicated to treat episodes of acute bronchospasm
- **Whirring noise during inhalation confirms correct placement of the capsule in the chamber**[1]
- **Clear capsule design allows patients to visualize any medication left in the capsule and inhale all of the remaining dose**[1]
- **SEEBRI capsules are for oral inhalation only and should not be swallowed**[1]

Sunovion Answers is there for your patients with support and answers. Call 1-844-276-8262 for more information.

Visit www.SEEBRI.us to learn more.

AUC, area under the curve; FEV_1, forced expiratory volume in 1 second; LAMA, long-acting muscarinic antagonist.

SEEBRI NEOHALER should be used with caution in patients with narrow-angle glaucoma and in patients with urinary retention. Prescribers and patients should be alert for signs and symptoms of acute narrow-angle glaucoma (e.g., eye pain or discomfort, blurred vision, visual halos or colored images in association with red eyes from conjunctival congestion and corneal edema) and of urinary retention (e.g., difficulty passing urine, painful urination), especially in patients with prostatic hyperplasia or bladder-neck obstruction. Patients should be instructed to consult a physician immediately should any of these signs or symptoms develop.

STUDY DESIGN

The efficacy of SEEBRI NEOHALER was established in two 12-week, pivotal trials. The safety of SEEBRI NEOHALER was established in four 12-week lung-function trials and one 52-week, long-term study.[1,2]

For additional information, please see the Brief Summary of Prescribing Information on the following pages.

Please visit www.SunovionProfile.com/SEEBRI for full Prescribing Information and Patient Information.

References: 1. SEEBRI NEOHALER [prescribing information]. 2017. 2. Data on file. GEM1 and GEM2 clinical study reports. Sunovion Pharmaceuticals Inc.

seebri™ neohaler®

(glycopyrrolate) inhalation powder 15.6 mcg

seebri™ neohaler®

(glycopyrrolate) inhalation powder

BRIEF SUMMARY OF FULL PRESCRIBING INFORMATION

Please see package insert for full Prescribing Information, including Patient Information.

INDICATIONS AND USAGE

SEEBRI™ NEOHALER® is indicated for the long-term, maintenance treatment of airflow obstruction in patients with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and/or emphysema.

CONTRAINDICATIONS

SEEBRI NEOHALER is contraindicated in patients who have demonstrated hypersensitivity to glycopyrrolate or to any of the ingredients.

WARNINGS AND PRECAUTIONS

Deterioration of Disease and Acute Episodes

SEEBRI NEOHALER should not be initiated in patients during acutely deteriorating or potentially life-threatening episodes of COPD. SEEBRI NEOHALER has not been studied in subjects with acutely deteriorating COPD. The initiation of SEEBRI NEOHALER in this setting is not appropriate.

SEEBRI NEOHALER should not be used for the relief of acute symptoms, i.e., as rescue therapy for the treatment of acute episodes of bronchospasm. SEEBRI NEOHALER has not been studied in the relief of acute symptoms and extra doses should not be used for that purpose. Acute symptoms should be treated with an inhaled, short-acting $beta_2$-agonist.

COPD may deteriorate acutely over a period of hours or chronically over several days or longer. If SEEBRI NEOHALER no longer controls symptoms of bronchoconstriction; the patient's inhaled, short-acting $beta_2$-agonist becomes less effective; or the patient needs more inhalation of a short-acting $beta_2$-agonist than usual, these may be markers of deterioration of disease. In this setting, a re-evaluation of the patient and the COPD treatment regimen should be undertaken at once. Increasing the daily dose of SEEBRI NEOHALER beyond the recommended dose is not appropriate in this situation.

Paradoxical Bronchospasm

As with other inhaled medicines, SEEBRI NEOHALER can produce paradoxical bronchospasm that may be life-threatening. If paradoxical bronchospasm occurs following dosing with SEEBRI NEOHALER, it should be treated immediately with an inhaled, short-acting bronchodilator; SEEBRI NEOHALER should be discontinued immediately, and alternative therapy instituted.

Immediate Hypersensitivity Reactions

Immediate hypersensitivity reactions have been reported after administration of SEEBRI NEOHALER. If signs suggesting allergic reactions occur, in particular, angioedema (including difficulties in breathing or swallowing, swelling of the tongue, lips, and face), urticaria, or skin rash, SEEBRI NEOHALER should be discontinued immediately and alternative therapy instituted. SEEBRI NEOHALER should be used with caution in patients with severe hypersensitivity to milk proteins.

Worsening of Narrow-Angle Glaucoma

SEEBRI NEOHALER should be used with caution in patients with narrow-angle glaucoma. Prescribers and patients should be alert for signs and symptoms of acute narrow-angle glaucoma (e.g., eye pain or discomfort, blurred vision, visual halos or colored images in association with red eyes from conjunctival congestion and corneal edema). Instruct patients to consult a physician immediately should any of these signs or symptoms develop.

Worsening of Urinary Retention

SEEBRI NEOHALER should be used with caution in patients with urinary retention. Prescribers and patients should be alert for signs and symptoms of urinary retention (e.g., difficulty passing urine, painful urination), especially in patients with prostatic hyperplasia or bladder-neck obstruction. Instruct patients to consult a physician immediately should any of these signs or symptoms develop.

ADVERSE REACTIONS

Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, the adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in clinical trials of another drug and may not reflect the rates observed in clinical practice.

The SEEBRI NEOHALER safety database included 3415 subjects with COPD in four 12-week lung function trials and one 52-week long-term safety study. A total of 1202 subjects received treatment with SEEBRI NEOHALER 15.6 mcg twice-daily (BID). The safety data described below are based on the four 12-week trials and the one 52-week trial.

12-Week Trials

The incidence of adverse reactions associated with SEEBRI NEOHALER in Table 1 is based on four 12-week, placebo-controlled trials in 2908 subjects with COPD. In the total population, 61.2% of patients had moderate COPD and 37.8% had severe COPD. Overall, 62% were males, 90% were Caucasian, and the mean age was 63 years (ranging from 41 to 89 years). In this population, 53% were identified as current smokers with an average smoking history of 48 pack-years.

The proportion of subjects who discontinued treatment due to adverse reactions was 2.4% for the SEEBRI NEOHALER-treated patients and 3.8% for placebo-treated patients.

Table 1. Adverse reactions with SEEBRI NEOHALER (greater than or equal to 1% incidence and higher than placebo) in COPD patients

Adverse Reaction	SEEBRI NEOHALER 15.6 mcg BID (N=961) n (%)	Placebo (N=938) n (%)
Upper respiratory tract infection	32 (3.4)	22 (2.3)
Nasopharyngitis	20 (2.1)	18 (1.9)
Urinary tract infection	13 (1.4)	12 (1.3)
Sinusitis	13 (1.4)	7 (0.7)
Oropharyngeal pain	17 (1.8)	11 (1.2)

Other adverse reactions occurring more frequently with SEEBRI NEOHALER than with placebo, but with an incidence of less than 1% include rash, pruritus, gastroenteritis, hypersensitivity, atrial fibrillation, insomnia, pain in extremity, dysuria, vomiting, productive cough, and diabetes mellitus/hyperglycemia.

52-Week Trial

In a long-term safety trial, 507 subjects were treated for up to 52 weeks with glycopyrrolate 15.6 mcg twice-daily or indacaterol 75 mcg once-daily. The demographic and baseline characteristics of the long-term safety trial were similar to those of the placebo-controlled efficacy trials described above. The adverse reactions reported in the long-term safety trial were consistent with those observed in the placebo-controlled trials of 12 weeks. Additional adverse reactions that occurred with a frequency greater than or equal to 2% in the group receiving glycopyrrolate 15.6 mcg twice-daily that exceeded the frequency of indacaterol 75 mcg once-daily in this trial were: diarrhea, nausea, upper abdominal pain, fatigue, bronchitis, pneumonia, rhinitis, back pain, arthralgia, dyspnea, and wheezing.

Postmarketing Experience

The following additional adverse reactions have been identified during worldwide post-approval use of glycopyrrolate, the active ingredient in SEEBRI NEOHALER, at higher than the recommended dose. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure. These adverse reactions are: angioedema, paradoxical bronchospasm and dysphonia.

DRUG INTERACTIONS

Anticholinergics

There is a potential for an additive interaction with concomitantly used anticholinergic medications. Therefore, avoid coadministration of SEEBRI NEOHALER with other anticholinergic-containing drugs as this may lead to an increase in anticholinergic effects.

USE IN SPECIFIC POPULATIONS

Pregnancy

Teratogenic Effects: Pregnancy Category C

There are no adequate and well-controlled studies with SEEBRI NEOHALER in pregnant women. Because animal reproduction studies are not always predictive of human response, SEEBRI NEOHALER should only be used during pregnancy if the potential benefit to the patient justifies the potential risk to the fetus. Women should be advised to contact their physician if they become pregnant while taking SEEBRI NEOHALER.

Glycopyrrolate was not teratogenic in Wistar rats and New Zealand White rabbits at approximately 1400 and 530 times, respectively, the MRHD in adults (on an AUC basis at maternal inhaled doses up to 3.83 mg/kg/day in rats and up to 4.4 mg/kg/day in rabbits).

Non-teratogenic Effects:

Glycopyrrolate had no effects on peri-natal and post-natal developments in rats at approximately 1100 times the MRHD in adults (on an AUC basis at maternal subcutaneous doses up to 1.88 mg/kg/day).

Labor and Delivery

There are no adequate and well-controlled human trials that have investigated the effects of SEEBRI NEOHALER during labor and delivery. In human parturients undergoing Caesarean section, 86 minutes after a single intramuscular injection of 0.006 mg/kg glycopyrrolate, umbilical plasma concentrations were low.

Nursing Mothers

It is not known whether SEEBRI NEOHALER is excreted in human breast milk. Because many drugs are excreted in human milk, caution should be exercised when SEEBRI NEOHALER is administered to a nursing woman. Since there are no data from well-controlled human studies on the use of SEEBRI NEOHALER by nursing mothers, a decision should be made whether to discontinue nursing or to discontinue SEEBRI NEOHALER, taking into account the importance of SEEBRI NEOHALER to the mother.

It is not known whether glycopyrrolate is excreted in human breast milk. Glycopyrrolate (including its metabolites) have been detected in the milk of lactating rats and reached up to 10-fold higher concentrations in the milk than in the blood of the dam.

Pediatric Use

SEEBRI NEOHALER is not indicated for use in children. The safety and efficacy of SEEBRI NEOHALER in pediatric patients have not been established.

Geriatric Use

Based on available data, no adjustment of the dosage of SEEBRI NEOHALER in geriatric patients is warranted. SEEBRI NEOHALER can be used at the recommended dose in elderly patients 75 years of age and older.

Of the total number of subjects in clinical studies of SEEBRI NEOHALER, 45% were aged 65 and older, while 10% were aged 75 and older. No overall differences in safety or effectiveness were observed between these subjects and younger subjects, and other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out.

Renal Impairment

No dose adjustment is required for patients with mild and moderate renal impairment. SEEBRI NEOHALER should be used in patients with severe renal impairment (estimated GFR less than 30 mL/min/1.73m^2), including those with end-stage renal disease requiring dialysis, if the expected benefit outweighs the potential risk since the systemic exposure to glycopyrrolate may be increased in this population.

Hepatic Impairment

No dose adjustment is required for patients with hepatic impairment. The effects of hepatic impairment on the pharmacokinetics of glycopyrrolate have not been studied.

OVERDOSAGE

An overdose of glycopyrrolate may lead to anticholinergic signs and symptoms such as nausea, vomiting, dizziness, lightheadedness, blurred vision, increased intraocular pressure (causing pain, vision disturbances, or reddening of the eye), obstipation or difficulties in voiding.

In COPD patients, repeated orally inhaled administration of SEEBRI NEOHALER at total doses of 124.8 and 249.6 mcg once-daily for 28 days were well tolerated.

PATIENT COUNSELING INFORMATION

Advise the patient to read the FDA-approved patient labeling (Patient Information and Instructions for Use).

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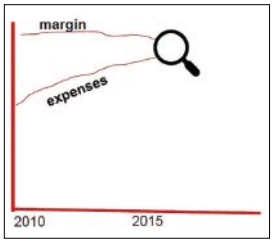
Pulmonary Lab Economics

by Matthew J. O'Brien, MS, RRT, RPFT, FAARC

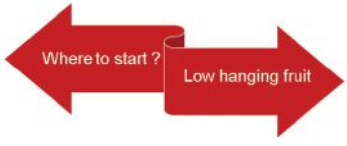
Now more than ever, every hospital department is being challenged to help reduce overall costs. The factors shaping this new reality include aging and uninsured populations, declining reimbursement, increased consumable costs, and labor inefficiencies.

About three years ago at a monthly manager's meeting, our chief of financial operations reviewed our hospital's financial health, as he did every month. Overall, the picture was good and the hospital was on solid ground. But what was different is that he showed a graphic of the hospital expenses plotted against the hospital revenue, and then stated in a very direct manner, "When this line (expenses) bumps into this line (revenue), we will have a problem." He presented that fact in a humorous style, and of course everyone laughed. Since then, those lines have crossed, even though our volume is as robust as the economy appears to be, and no one is laughing now. In a very short period of time, we are now targeting a cost reduction effort of $80 million.

Even though most pulmonary labs are small and tend to stay off hospital administrators' radar, pulmonary lab managers need to do our part to look for efficiencies in our methods, workflow, and capital and operating expenses. It is clear that we will all have to contribute to survive. The methods described here relate easily to other areas in respiratory care or ancillary departments.



Where should you start in the pulmonary lab? You have to start somewhere. Here's my strategy.



about the authors...

Matthew O'Brien, MS, RRT, RPFT, FAARC, is manager of the Pulmonary Diagnostics Lab at University of Wisconsin Hospital and Clinics in Madison, WI.

Capital equipment

There are multiple manufacturers of quality pulmonary function testing (PFT) equipment, and new players starting to enter the U.S. market. Managers need to consider an array of factors, including cost per test, testing capabilities required, footprint, customer service, warranty period, licensing fees, and ease of use.

Specialized capital equipment

When requests for specialized equipment are being assessed, it is important to verify that a billable Current Procedural Terminology (CPT) code exists and whether the device is FDA-approved. Most hospitals require managers to complete comprehensive capital requests to provide specific details to justify the acquisition. If reimbursement is absent or the capital equipment does not support patient care, it is nearly impossible to get approval to purchase. Managers need to find creative means to fund these endeavors, including physician research funds, grants, or donations.

Consumable costs

Regardless of the type and age of your PFT system, you need to know the costs of the consumables. For spirometry and lung volumes, this is the cost of the filter and nose clip. It could also include a breathing circuit. For diffusion testing there will be costs for gas and sample lines that need to be replaced over time. Although it is not the norm, some labs do not use filters and instead choose to change out the reusable flow sensor after each patient. In high-volume labs (>30 patients a day), this is likely to be impractical, but if just a handful of tests are done each day, this could be worth exploring. The feasibility of clean-

How to help save dollars for your hospital

ing flow sensors or any reusable equipment depends on having the appropriate space, expertise, and time. Remember that items coming in contact with mucus membranes need a high level of disinfection, and items that are labeled for single-patient use should not be reprocessed. Finally, labs should consult with their infection control department for guidance within their facility in addition to following manufacturer recommendations.

Service contracts

Think of service contracts as insurance policies. If you only have one car (PFT system) to drive and it breaks, it would be smart to have a plan in place to get it fixed ASAP. When purchasing a new system, we rarely worry about service issues during the first year because it should be covered under the original warranty. In my opinion, service contracts make sense if you only have one or two PFT systems, but they can quickly become far too expensive when you have multiple devices. When your lab is big, you have some degree of self-insurance because you have multiple systems to act as backups. To help save money, negotiate the service contract at the time of purchase, when the sales person is motivated. Consider a parts-only service contract if you or your biomedical department has the basic skills necessary to exchange modules. Larger labs may wish to invest in sending a dedicated biomedical staff person to the vendor for training.

Physician ordering practices

Ordering practices are often engrained in institutions and are difficult to change. It is very common for labs to use ordering terms such as "Complete," "Full," or "Formal" PFTs. These vague terms usually mean everything: spirometry, flow-volume loop, lung volumes, diffusion, airway resistance, bronchodilators, and an arterial blood gas (ABG). There are several problems with using these fixed profiles:

- It often results in unnecessary testing.
- It drives up costs for the insurer.
- It results in higher co-insurance payments for the patient.
- It restricts the volume of patients your lab can see.
- It can result in a factory approach to patient testing rather than really connecting with the patient and trying to assess the patient's condition.

Workflow

What we do in the pulmonary lab, and how we do it, is often guided by "the way it has always been done." Are you doing flow-volume loops or lung volumes post bronchodilator on all patients? If your answer is, "That is what we always have done," then it is time to evaluate your workflow. Unnecessary testing is a waste of labor and materials. Critically consider whether the data your lab provides are being used clinically to assess function. If the clinician says, "I never look at the lung volumes post bronchodilator or the airway resistance," then why are you doing it? A patient being seen for an annual check-up of their COPD or sarcoidosis does not need a flow-volume loop or bronchodilator testing after it has been determined that the inspiratory loop is normal or that a bronchodilator response exists. Keep in mind that educating clinicians on the potential value of everything we can do in a pulmonary lab is a separate discussion.

Quality assurance/biologic quality control

Certainly, quality assurance needs to be part of every lab's process to ensure confidence in pulmonary data. Using biologic quality control methods is likely the most cost-effective tool to show that a device is in-range or control. Large labs might consider investing in biologic simulators; however, these do increase operating cost for specialized gases and training. Determine a biologic quality control frequency that makes sense for your lab and meets the joint American Thoracic Society/European Respiratory Society recommendations.

Spectrum of testing offered

The major revenue producers for most pulmonary labs are spirometry, lung volumes, diffusion, and post bronchodilator testing. If you have the ability to perform other testing, such as respiratory muscle forces, high altitude simulation test, shunt studies, and 6-minute walk tests, this would expand your lab's area of expertise with minimal expense. It is also important to be able to offer bronchoprovocation testing using methacholine, exercise, eucapnic hyperventilation, or mannitol. When looking at VO_2, metabolic, and infant testing, the questions to consider are how often you will be perfoming these and whether you can maintain staff competency. If the projected volume for VO_2 testing is only once per month, it may be difficult to justify the investment. However, if the VO_2 system also has the ability to perform metabolic testing in the ICU, then having this equipment makes sense. When you are faced with an aging infant pulmonary system and infrequent requests for testing (eg, less than three times per year), it is time to stop offering this diagnostic. It is nearly impossible for staff to maintain

competency on low-frequency procedures, which increases the chances that a mistake will occur.

Duplication of services

It is possible that duplication of services exists in your hospital. Examples include VO_2 max testing, ABG analysis, and spirometry. Some of this duplication might make sense for patient convenience, but each instance of redundant services should be reviewed.

ABG analysis

If there is a core laboratory providing ABG analysis at your pulmonary lab's location, it is time to exit the analysis business. We can all appreciate the convenience of having the analyzer right in the lab, but the costs of quality control and operating supplies are simply too great. Develop a new workflow to ensure your ABG specimens get to the lab quickly, and work with the lab information technology person to enable the results to print out automatically in your PFT lab office.

Cardiopulmonary exercise testing

In our large academic medial institution, there are four cardiopulmonary exercise systems: pediatric pulmonary, adult pulmonary, adult cardiology, and sports medicine. Even though each population is unique and may be tested differently, they all will have a very similar reportable data output. Where possible, departments should collaborate to determine how these VO_2 testing systems/spaces might be shared. If a cardiology or pulmonary department is doing multiple VO_2 studies a day, it can certainly make sense to have multiple systems. However, if the reality is that the cardiology group does three tests per week and the pulmonary group does one test per week, it makes sense to eliminate the costs and risks associated with maintaining multiple devices that draw from operating and capital funds.

Spirometry

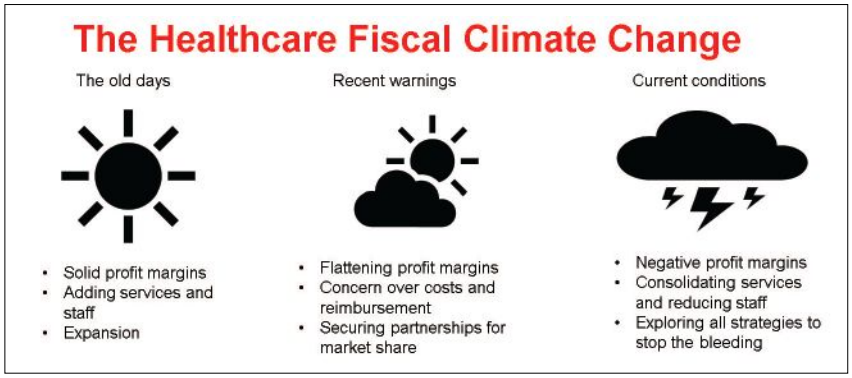
Unfortunately, it is difficult or nearly impossible to put this genie back in the bottle. Many outlying clinics that provide this service are well trained and provide quality diagnostic results. However, some locations, lacking proper training or using a production mentality, provide worthless results. When it is evident that retraining is not improving quality, it makes sense to stop providing spirometry at these locations. Poor-quality spirometry data is a waste of time for the clinic and patient and it drives up health care costs. It is better to send the patient to the pulmonary lab for testing.

Supporting multidisciplinary clinics

The implementation of multidisciplinary clinics for certain patient populations, such as neurology, offers advantages for the patient and possibly the care team. Patient-centered care, however, does not necessarily translate to labor efficiency, and this is a prime example. In many multidisciplinary clinics, a patient checks in and several specialties take turns evaluating the patient while he or she stays in one place. It is not uncommon for pulmonary labs to be invited to support/staff these clinics to provide spirometry testing at a minimum. Carefully evaluate whether you have enough employees to staff these monthly or weekly clinics, and set some ground rules if you agree to participate. It is important to have an equal or slightly greater number of clinic patients compared to the specialties seeing them, otherwise the efficiency is lost. When these clinics have several cancellations or no shows, clinics need to consider scheduling the PFT portion after the clinic and focus on letting key providers seeing the patient in the multidisciplinary setting; otherwise staff members are simply standing around. Another strategy to consider is staggering the providers starting times, to see the patients.

Summary

The fiscal climate change has been forecasted for some time. By closely evaluating our consumable cost, workflows and physician ordering practices, we will weather this storm. ■



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Parker's Bill

How the untimely death of a 21-year-old led the governor of Utah to sign a resolution calling for home monitoring of post-surgery patients

by Debbie Bunch

The Utah delegation witnessed the signing of Parker's Bill by Governor Gary Herbert (center) in April. Pictured (left to right) are: Steve Abplanalp, Reid Cowan, Kim Bennion, Dr. Michael Catten, Parker Cowan, Jeffrey Stewart, KC Stewart, Senator Van Tassell, Yvonne Gardner, Greg Gardner, Amanda Thompson, Shay Uresk, and Maddy Ivie.

Yvonne Gardner sent her son and daughter into surgery on the same day back in December 2016. Both had their tonsils out, and Parker also had his adenoids removed. Both went home with prescriptions for the opioid Percocet. Her son received a prescription for the antibiotic Biaxin as well.

Twenty-one-year-old Parker bounced back quickly. A couple of days later he came by the house to wish everyone a Merry Christmas and drop off some gifts. He spent a few minutes teasing his younger sister, who was still lying around on the couch, feeling miserable and saying she couldn't talk.

Parker's new bride Madilyn gave him his next dose of Percocet at around 1 a.m. the next morning. When she got up at 8 a.m., he was snoring away and she let him sleep. When Madi checked on Parker around noon, he was lifeless. The medical examiner found that Parker's lungs were full of fluid and ruled the cause of death to be pneumonia. However, he also noted that fluid in the lungs could be caused by respiratory depression resulting from opioids and listed that as a secondary cause. No other issues were found.

Given her son's robust condition the night before, Gardner never bought pneumonia as the cause of death. "He was not having any issues breathing," says the Utah mom.

Not the first time

Parker's surgeon, Michael Catten, MD, an otolaryngologist at the 49-bed Uintah Basin Medical Center (UBMC) in Roosevelt, UT, and Shaylynn Uresk, BSRT, RRT, RRT-SDS, RPSGT, Sleep Center and durable medical equipment manager at the hospital, didn't have confidence in pneumonia as the cause of death either. Nor was it the first time this had happened.

"We had a series of deaths postoperatively," explains Uresk. "Each death had a common thread, pneumonia, on the autopsy report." She says that while they publicly accepted those reports, they privately remained skeptical of the findings. "The patients were completely healthy hours before their death," says Uresk. "They did not have any symptoms of pneumonia."

As Parker's surgeon, Dr. Catten was devastated by his death, and when Yvonne Gardner reached out to him with questions about how it could have possibly been pneumonia when her son had shown no signs of pneumonia the night before, he began to seriously believe opioids were responsible. He reached out to Uresk and her colleagues in the respiratory care department to help find a solution. "I approached the RTs because they are the best trained to understand and help with the problem," says the physician.

The answer: home monitoring for post-surgery patients who are prescribed opioids for pain.

Cautious action pays off

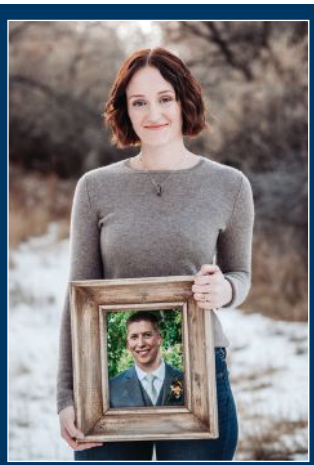
"Dr. Catten, the attending surgeon, purchased pulse oximeters to send home with the patients," says Uresk. "He was terrified that something not understood would happen again." Those fears were validated three weeks later when a 15-year-old girl also recovering from a tonsillectomy nearly died from what was deemed a narcotic reaction. "The pulse ox alerted the family and saved her life," says the RT manager.

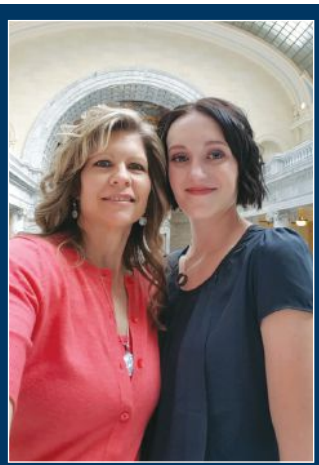
The incident confirmed their earlier suspicions that opioids were to blame for cases like these, and further investigation revealed a number of other "narrow misses" among surgical patients in their small community. "That epiphany was heartbreaking," says Uresk. "That we had been blind to such a common problem."

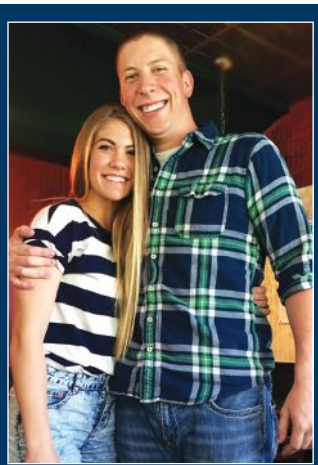
As an AARC member, Uresk had met Kim Bennion, MsHS, RRT, CHC, administrative director of respiratory care at Intermountain Healthcare (ICU), a 23-facility system headquartered in Salt Lake City, at various Utah Society for Respiratory Care events. She picked up the phone and called her to get her take on the issue, and quickly learned that IHC was working on the same concerns. Bennion put her in contact with another AARC member, Steven Abplanalp, MBA, RRT, who is the executive director of respiratory care and sleep services at IHC.

Close collaboration

"Intermountain has been working on opioid processes for about three years now," explains Abplanalp. "Respiratory care was asked to lead the process, which entailed three key buckets of work." Specifically, the process involves acute and chronic pain management, monitoring during sedated procedures, and addressing previously diagnosed and suspected cases of obstructive sleep apnea in surgical patients. "Key goals for inpatient monitoring included, but







(Photos to left)

Parker's young wife Madi lost the love of her life when Parker died from respiratory depression caused by the opioids he was taking after his surgery.

Parker's mother, Yvonne Gardner, and his wife, Madilyn Stewart, spent many hours at the Utah state legislature advocating for the resolution.

Parker with his younger sister, Sadie, who had her tonsils removed the same day as her brother and was prescribed the same dose of Percocet for postoperative pain.

were not limited to, the use of $ETCO_2$ and/or acoustic monitoring, the identification of higher risk patients, and the standardization of education and equipment and supplies for our 23-hospital corporation," says Abplanalp.

He says IHC is currently in the process of implementing both inpatient and home-monitoring pilots. "We have installed a central monitoring system that we will use in one of our pilots and are attempting to define the use of this system for a pilot of home-monitoring patients," says Abplanalp. "The key here is to identify those patients most at risk, and that is not always [obstructive sleep apnea] diagnosed or 'suspected' patients."

Uresk says RTs at her hospital have worked closely with Dr. Catten, Parker's family, and the IHC staff to develop hypoxia protocols to protect patients. In light of the long-standing acceptance of narcotics for post-surgery patients, getting physicians, nurses, and administrators to embrace these protocols has been a challenge, but they are determined to stay the course. Says Dr. Catten, "We still need to get our inpatient hypoxia protocol completely accepted. Respiratory therapy really is the group to spearhead this, since they understand the problem more than doctors and nurses."

Being able to partner with IHC during the process has been invaluable, and Steven Abplanalp says the feeling is mutual. "UBMC reached out to us because they knew we had done a ton of groundwork. We were honored to partner with such a progressive hospital." He notes the two facilities are working side by side on a study comparing pulse oximetry with acoustic monitoring and will soon

The Utah Resolution

The Utah resolution, which specifically mentions the proactive measures taken by respiratory therapists at Uintah Basin Medical Center and Intermountain Healthcare, calls for —

- The Department of Health to convene a multi-stakeholder, cross-sector group dedicated to gathering data and best practices to avoid deaths from opioid-induced postoperative respiratory depression.
- Health care professionals to be advised about the dangers of opioid-induced respiratory depression and the need for in-home monitoring of patients who are prescribed an opioid after surgery.
- Hospitals and academics to collect more data about the risks of taking an opioid after surgery and the deaths resulting from opioid-induced postoperative respiratory depression, especially regarding the effects of the opioid on a patient's breathing.

These first steps are expected to raise the bar on opioid drug safety in the state of Utah and hopefully will serve as an example for other states to follow as they work to address the growing opioid crisis in America. ■

(Photos to left)

Parker's mom was determined to do something to prevent other needless deaths due to opioid pain medications.

AARC members Shaylynn Userk, left, and Kim Bennion, right, joined Dr. Michael Catten at one of the meetings held to support the resolution.

AARC members rally behind efforts to ensure pain medications don't end up being a death sentence for people in their state.

add an $ETCO_2$ component as well. Right now the pilot asks patients to call in if problems arise, but IHC is also setting up a telemonitoring piece that should make the monitoring even more effective.

Uresk says her hospital is looking at placing RTs in the operating room to assist with positive expiratory pressure therapy preoperatively as well, and will be educating every general anesthesia patient sent home with narcotics about the need for an alarming pulse oximeter/acoustic monitor.

Taking it to the legislature

The clinical work occurring at these two facilities is remarkable. But thanks to Yvonne Gardner, the mission to ensure other postoperative patients on opioids avoid the fate suffered by her son is much larger. Her initial conversations with Dr. Catten have grown into a full-fledged effort to get something done on the state level. "I believe that if Parker would have been sent home with an alarming pulse oximeter, and if he and his wife would have been educated about the dangers of the opioid side effects, he would be here today," says Gardner.

Uresk says the family began reaching out to state legislators, including Sen. Kevin Van Tassell and Rep. Scott Chew, who proved to have an open ear, and she and her colleagues simply rallied behind them. "We wanted to find ways to document what was happening, so we could improve the practice of evidence-based medicine," she says. "We attended all the meetings and offered our help in any way we could, big or small."

Together, they accomplished the first leg of their journey in March when Utah Governor Gary Herbert signed a resolution passed by the state legislature calling for Utah to "avoid the continuing needless deaths that result from the use of opioids throughout the state."

Gardner believes the resolution, which is informally known as "Parker's Bill" and specifically calls for home monitoring, will help to open the eyes of everyone in Utah regarding the dangers posed by opioids. "Knowledge is power and can save their lives," she says. "Opioids do not let you live because you just found the love of your life and you want to spend the rest of your life making memories with them, they don't discriminate if you are a new mother or a mother of four, they don't discriminate on what kind of surgery you choose."

Once more people are aware of the risks, she believes more surgery patients will either forego these pain medications in favor of something less dangerous or demand home monitoring to ensure they don't quit breathing during their sleep. "I would have paid any cost to still have my son with me," she says. "I believe that when the State of Utah is able to collect better statistics on this issue, we will find a very terrifying and sad number of lives that were lost needlessly."

Steven Abplanalp says steps are already being taken to acquire that information. His group recently met with key personnel in the Utah Department of Health to discuss the potential for a retrospective study that would look at postoperative patients who were sent home with opioids and then died at home within seven days and had pneumonia listed as the cause of death. "It's our belief these are opioid-induced respiratory depression events," says Abplanalp.

Dr. Catten credits the Utah resolution with getting the ball rolling, and says studies like this one will keep it

(Photos to right)

Parker Stewart's family and caregivers believe his death was the result of opioid-induced postoperative respiratory depression.

Parker and Madi were just starting their life together when tragedy struck.

moving. "By bringing attention to the issue, we increase discussion and awareness," he says. "Now data needs to be collected and published, which will allow recommendations and even mandates from the legislature to protect patients."

Uresk says she's already seeing a change in patient attitudes from the publicity the resolution has received. Some are asking — indeed, demanding — home monitors. She and her colleagues are also advocating for a change in the way reporting is completed for postoperative deaths to get a better handle on how narcotics are involved, and they are investigating acoustic monitors, with the goal of using the combined technologies to better serve patients.

Never let go

Yvonne Gardner says she's talked to many people during her journey to get the Utah resolution passed through the legislature and signed by the governor — people with stories similar to the one she's still grappling with. Some, like the young man about Parker's age who was also on opioids post-tonsillectomy and died in his family's living room after falling asleep during a football game, echo her own experience. Others, like a neighbor who was on opioids for post-surgical pain and had to be rushed to the hospital after her husband found her not breathing at 4 a.m., were lucky enough to be found in time and survived.

Gardner says it's the latter stories that really drove her. "I have many other stories of near-misses that prompted me to not let this go," she says. "If someone would have done something sooner, my son would still be alive." ■

— 2018 —

Since 1947, the AARC has been leading the effort to advance the science and practices of the respiratory care profession while promoting the highest quality of care for our patients. Collaborating with the respiratory communities at-large, we have successfully advocated at the federal, state and local level for patients, their families, the community, the profession and the respiratory therapist.

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The Challenges and Promises of Bringing Advanced Practice Providers to the Respiratory Care Profession

by Robert L. Joyner, Jr., PhD, RRT, RRT-ACCS, FAARC

Enthusiasm for the Advanced Practice Respiratory Therapist (APRT) has been evolving over the past few years, and this interest by practicing respiratory therapists, students, and supportive physicians continues to blossom. Anecdotally, the reasons for this growing passion vary: practicing therapists have a desire to incorporate additional skills into their daily work, students view other professions with some envy for what they see as practice opportunities beyond the scope of a respiratory therapist, pulmonary physicians want the opportunity to rely on advanced practice providers who bring a significant knowledge base, and therapists believe they could do a better job for their patients if they were less constrained by current hospital practices.[1] Not to be left out, there is the anticipation that advanced practice respiratory therapist employment would bring professional reverence and higher salaries.

From participating in discussions around the country on this topic, it is clear that the first objective is to assure we all work from a common definition. This definition should be applied uniformly across discussions by practicing respiratory therapists, local and national respiratory care organizations, and state administrative bodies considering the value of adding the APRT to their state. Anything short of a standardized definition risks creating administrative chaos and muddying the water of professional expectations. Federal and state health care administrators use definitions of practitioners to assist in

health care policy development across the United States

For the respiratory care profession, a standardized definition is an important first step to the success of creating this new category of health care provider and assuring the composition of the care they will provide.

Advanced practice providers have been present in the American health care system since the mid-1960s. In 1965, Medicare and Medicaid programs were signed into law to advance federal health care coverage to low-income women, children, the elderly, and people with disabilities.[2] This introduction of large numbers of people seeking health care resulted in physicians being unable to meet the new demand for primary care services. At that time, the nursing profession was in a position to help fulfill this new workforce need.[3] Leaders of the nursing profession believed that distinctively educated nurses could be trained to expand their roles and meet the federally induced urgent need. The physician shortage and society's demand for primary care services were the drivers for the development of the nurse practitioner profession.[3]

Definitions

The respiratory care profession is at a crossroads, driven at least in part by other professions encroaching on the scope of practice that has historically been that of the respiratory therapist. Examples include, but are not limited to, ventilator management, initial care of patients who present acutely short of breath to the emergency room, and home care of patients needing assistance with breathing maladies. The profession of respiratory care evolved over the decades from the need for a technician trained to apply specialty devices (e.g., the IMV bag on the PBT MA-1) to a professional who is highly knowledgeable in the care and management of patients with cardiopulmonary disease. The difficulty lies with other professionals who are not as extensively educated in the care of patients with cardiopulmonary disease as a respiratory therapist, but are in the legally responsible position of writing the orders for the interventions that we do (e.g., physician assistants and nurse practitioners).

The evolution of an APRT will require our profession to come to an understanding of what an advanced practice respiratory therapist is expected to be. Without compromise, an APRT must be defined as an individual who practices respiratory care at a level beyond that of a Registered Respiratory Therapist. The APRT is not a highly functioning Registered Respiratory Therapist and cannot be a substitute for one. The APRT is a new mid-level practitioner that does not currently exist in the health care system. This definition of advanced practice respiratory care requires our profession as a whole to review and evaluate hospital privileges, community-based practice environments, federal rules on advanced practice providers, and state-level health care practice acts.

Providing care at the top of your license

Advanced practice and the advanced practice provider can be confused by the uninformed with the care delivered by a highly skilled respiratory therapist. Currently many state licensure acts permit practicing therapists to perform interventions that may be considered advanced as it relates to the knowledge level needed to perform the intervention competently, but it is important to understand that the skill falls within the the practice act as it is currently written. Advanced practice providers, commonly referred to as mid-level providers, enjoy expanded practice on two specific fronts currently not available to respiratory therapists in any state.[4] First, they have prescriptive authority, which means that mid-level providers are able to write a prescription for a drug that the patient would ultimately obtain at a neighborhood pharmacy. Second, advanced practice providers are directly reimbursable through Medicaid and Medicare,[5] which allows the advanced practice provider to be of specific and direct benefit to the financial stability of a medical practice. This ability to be reimbursed for services happens both within the medical office and the hospital setting. This increases the value of the advanced practice provider to potential employers and is a serious limitation to respiratory care's opportunity to become advanced practice providers.

Some challenges in developing the APRT

The first challenge in developing the APRT is schooling. University-based preparation for respiratory therapists is significantly disadvantaged by the small number of programs when compared to community college programs: 74 vs. 354, respectively (http://www.coarc.com). Published CoARC accreditation standards for advanced practice programs require master's degree preparation for compliance (http://www.coarc.com). The most important implication that a university will

Robert L. Joyner, Jr., PhD, RRT, RRT-ACCS, FAARC, is special assistant to the provost for health care programming, associate dean of the Richard A. Henson school of science and technology, and director of the respiratory therapy program at Salisbury University in Salisbury, MD. He is also a member of the AARC Ad-hoc Committee on Advance Respiratory Therapy Practices, Credentialing and Education.

investigate when considering whether to start an APRT program is financial viability.[6] Altruism is not a prominent feature of university administration.

Another challenge is establishing prescriptive authority and qualifying for reimbursement. Prescriptive authority for mid-level providers varies greatly across the United States. Some states allow these providers to write prescriptions for all medications, including controlled substances, while others require a physician's signature on all prescriptions.[4] In addition, not all states allow mid-level providers to order medical testing or to bill independently for their services. Some states require a physician to be present with a mid-level provider at all times, while other states allow a physician to be available by phone. These requirements also vary for physician assistants and nurse practitioners, both within a state and between states.[5]

Finally, using evidence of workforce need, there must be an earnest discussion about what skill sets an APRT must be able to provide. Currently practicing respiratory therapists already have a wide range of skills within their portfolio (e.g., arterial line insertion, hemodynamic monitoring, provision of extracorporeal membrane oxygenation, etc.), and therefore it is unlikely that providing technical expertise will be the way to differentiate between an RRT and an APRT. In fact, one can speculate that an APRT will spend less time providing direct patient care. Their duties are more likely to fall to directing the care of patients afflicted with cardiopulmonary disease, perhaps by leading multidisciplinary rounds on mechanically ventilated patients, discussing the management of COPD patients with frequent exacerbation, or explaining the newest pulmonary hygiene interventions to parents of a child who has been recently diagnosed with cystic fibrosis.

Academic needs

Educating competent APRTs will be a challenge as our current system of educating respiratory therapists is insufficient to produce mid-level practitioners. There is a need to develop an infrastructure of faculty who are able to teach and thrive in university environments with rigorous tenure and promotion requirements. Enhanced collaboration with physicians enthusiastic about educating and employing APRTs is pivotal. Finding and enrolling high-performing, academically oriented respiratory therapists who are likely to be successful in rigorous and highly competitive mid-level working environments will be difficult at best. These barrier-breaking individuals will need to be resourceful, confident, and not easily discouraged by environments that are not likely to be initially receptive to their introduction.

National Board for Respiratory Care (NBRC)

The development of a nationally recognized credential is critical. The NBRC has been the national credentialing organization for the profession of respiratory care since 1960. Utilizing the NBRC's expertise will be important to the future success of a national credential.

State legal and licensing authorities

Purposeful and direct engagement with state licensing authorities to institute advanced practice legislation within a state license is imperative. Anyone who was part of getting a respiratory care license in a state knows how daunting a process this can be. Embracing individuals who have the expertise to move legislation forward is an important consideration.

Summary

I have had the opportunity to talk about the potential of the APRT across the nation and with many current therapists and physicians. There is a tremendous enthusiasm for the ideas and a desire to have it happen in the near future. The reality is that the introduction of an APRT into our nation's health care system will be difficult, will require thoughtful discussions with all stakeholders, and above all, will be driven by a patient care need. Changing the health care system through a drive for enhanced professional respect or individual financial reward will likely lead to disappointment of the masses and a lost opportunity for the profession.

Cicero, a highly respected Roman politician and lawyer, published the "Six Mistakes Mankind Keeps Making Century after Century." All six of these are important, but in the effort to establish the APRT, it is important to remember the mistake of "attempting to compel others to believe as we do." We can't develop an APRT and make people want it — we must identify the health care need and then let politicians know that we can fulfill that need. ■

References

1. Uken C. Popularity of mid-level providers grows as millions join health insurance rolls. *Billings Gazette* Jan. 23, 2014.
2. O'Brien J. How nurse practitioners obtained provider status: lessons for pharmacists. Am J Health Syst Pharm 2003;60(22):2301-2307.
3. Mezey, M. *Nurses, nurse practitioners: evolution to advanced practice*, 3rd ed. New York: Springer; 1999.
4. Drug Enforcement Administration. Mid-level practitioner – controlled substance authority by discipline within state. https://www.deadiversion.usdoj.gov/drugreg/practioners/mlp_by_state.pdf. *Accessed May 21, 2018.*
5. Services CfMM. Medicare Carriers Manual, Part 3, Claims Process. https://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/downloads/R1734B3.pdf. *Accessed May 21, 2018.*
6. Morriss-Olson M. Feasibility checklist: The science of bringing new academic programs to life. https://www.academicimpressions.com/feasibility-checklist-the-science-of-bringing-new-academic-programs-to-life. *Accessed May 21, 2018.*

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INVESTING in the BSRC/BSRT

by Debbie Bunch

Therapists explain why they went for a four-year degree in the profession

A lot of respiratory therapists got into the profession because it offered an associate-degree entry to practice. Enroll in an accredited program and, two years later, you're out in the workforce, getting a great job that pays well and offers a sense of security that other professions simply cannot match.

If that sounds too good to be true, it is. These days, most health professions are raising their education levels. The nursing profession, for example, has been working to meet a recommendation included in a 2010 Institute of Medicine report calling for 80% of RNs to hold a bachelor's degree in nursing by 2020.[1] Anyone seeking to become a physical therapist today must earn a doctor of physical therapy degree.[2]

The AARC is working hard to ensure that respiratory therapists aren't left behind in this new environment. In 2015, the Association set a goal calling for 80% of RTs to have or be working toward a bachelor's degree by 2020. That goal was followed by a new CoARC standard stating that all *new* respiratory care educational programs must offer at least a BSRC/BSRT degree starting January 1 of this year. The AARC has issued a guidance document on how existing associate degree programs in states that allow community colleges to award baccalaureate degrees can transition to a bachelor's degree in respiratory care.

What do RTs think about the BSRC/BSRT degree? AARC members who already have them explain why they believe they are worth the investment.

The right path

Jennifer Barber, BSRC, RRT, RRT-ACCS, went back for her bachelor's degree through the RRT-to-BS degree program offered by Midwestern State University (MSU) in Wichita Falls, TX. The online program gives AS-degreed therapists from across the country the chance to earn a BSRC degree without leaving their homes or jobs, and it proved to be the right path for her.

David Kashnow, center, says his BSRC allowed him to achieve his goal of becoming a respiratory care program director.

"The process went extremely smoothly, from the application to registration, classes, and graduation," says Barber, who serves as director of clinical education for the respiratory therapy program at Gulf Coast State College in Panama City, FL. "It was very well organized — emails were always answered and support from faculty was given."

David Kashnow, BSRC, RRT, RRT-NPS, went through the same program and also gives the online concept high marks. "I chose to get my degree through an online learning format because of the flexibility it offered me as a learner," says the respiratory therapy program director at the Pima Medical Institute in Renton, WA. "I was able to set aside time in my schedule to complete the work when it was convenient for me."

Matt Bolinsky, BSRT, RRT, RRT-NPS, AE-C, was one of three graduates in the inaugural BSRT class at the University of North Carolina at Charlotte in 2008, and he says he was motivated to go back for the degree after realizing he would need it to continue to move forward in his career. The degree helped open many doors, and now he is director of cardiopulmonary care at two hospitals within the Carolinas Healthcare System, CHS Cleveland and CHS Kings Mountain, both in North Carolina.

Sasha Cook, BSRT, RRT, RRT-NPS, C-NPT, CPST, transferred to Boise State University for her BSRT after earning her associate's degree. Cook says it comes into play every day in her job as a transport therapist for Mercy Kids Transport in Springfield, MO. "My team is made up of one RT, one RN, and one EMT or pilot; there isn't anyone else," she says. "Not having anyone or anything to fall back on has really made education and knowledge important to me."

For Kari Woodruff, BSRC, RRT, RRT-NPS, FAARC, who got her BSRC from the University of Texas Medical Branch (UTMB) in Galveston back in 1998, the BSRC was her entry into the profession. Now a clinical specialist at Bunnell, Inc., she explains she was not an RT prior to getting her bachelor's degree, "but I knew I wanted to be in the medical field and most disciplines required a minimum bachelor's. Honestly, when I entered RT school, I didn't even know about any associate programs — my goal was to get a bachelor's regardless."

Dawn Aberle, BSRT, RRT, earned her BSRC from North Dakota State University in 2000. "The program I went to had appropriate prerequisite requirements and a well-organized internship and clinical program that led to successful passing of all the required exams to become an RRT," says Aberle, who works as a staff therapist at the Fargo VA Healthcare System and as a per-diem staff member at Sanford Medical Center in Fargo.

Matt Bolinsky went after his BSRC to move forward in his career.

Career enhancement

These therapists may have different stories to tell about how they pursued their bachelor's degrees in respiratory care, but they all believe the experience has enhanced their careers.

As a department director, Bolinsky says his program included elements on operational efficiency, growth, and team development, all of which he uses every day. "As a leader, supporting the team providing care at bedside is both challenging and rewarding," he says. "This role re-

According to CoARC, there are now 67 colleges and universities across the United States with educational programs leading to a bachelor's degree in respiratory care. That bodes well for the profession.

quires a different skill set but ultimately impacts all that happens at the bedside."

For Woodruff, the degree boosted her career advancement opportunities when she was still in the hospital, and it provided the opportunity to get the job she has now. "It was a minimum requirement for my position and is such for most industry positions that I am aware of," she says.

Barber says her degree gave her the confidence she needed to step out of her comfort zone to seek out a position in respiratory therapy education. "I learned valuable skills in leadership and educational techniques that I put to use on a daily basis," she says. "Now I have the opportunity to educate future respiratory therapists."

Kashnow went into his program after spending a number of years as a bedside therapist in an academic hospital before transitioning into the classroom, and he thought he was pretty well versed in the ins and outs of respiratory care. He was surprised by how much additional information he learned and how much he enjoyed the process. "The BSRC program at MSU was not only challenging, it was also a lot of fun," he says. Most importantly, the degree positioned Kashnow to thrive in his current program director position. "Obtaining my bachelor's degree satisfied the CoARC requirements for becoming a program director, which has always been a career goal of mine," Kashnow explains.

While Aberle says she has learned to define success in the profession as a thoroughness in patient care, she believes having her bachelor's degree opened the door to something she ended up loving — teaching RT students. "Nothing sparks your quest for more knowledge than having 12 students look to you for a complete explanation of disease processes, ventilator function, and oxygen devices," says Aberle. "You had to know your stuff! That experience made me a better therapist when I returned to the floors."

Jennifer Barber credits her BSRC with helping her educate the next generation of therapists.

Cook says she has gone into interviews where she knows her BSRC set her apart from the crowd. Several positions in her facility also require additional education. With extended education being expected more often these days, "I like to think I am ahead of the curve," she says.

Motivation and support

Of course, whether you decide to go for the BSRC/BSRT degree from the outset or return to school to get it, you have to be motivated and have the support of those around you.

For Barber, seeing so many patients who are critically ill, the opportunity to be a part of their care team sparked her pursuit of more knowledge. "I wanted more education and knowledge to help provide the best quality of care for my patients." She was a little worried about what her husband would think when she told him she wanted to go back to school, but she didn't need to be. "He and my three children supported me through the entire process," she says. Her teachers did the same, encouraging her to keep going and helping her anytime she needed it to ensure she would reach the finish line.

Bolinsky cites his AS degree program directors and hospital coworkers for providing him with the foundation in the profession that he needed to pursue his higher degree. Those program directors encouraged learning, professionalism, and growth, while his coworkers pushed

him to seek new ways to grow in the profession. Setting a good example for his own family pushed him forward, too. Says Bolinsky, "I am always saying to my children, 'never stop learning!' I try to live that as an example each day."

Kari Woodruff's job in the respiratory industry required the baccalaureate degree.

Woodruff says her impetus for deciding to pursue her BSRT degree came after she saw the respiratory care profession in action. "I worked various hospital jobs in my first couple years of college — EMT, [physical therapy] aide, ER admissions, surgical billing — which exposed me to many medical personnel," she says. "There was no question I would go into the medical field, but it wasn't until I stumbled upon the program at UTMB and shadowed an RT that I found my niche."

Cook points to teachers who let her stay late in the lab to improve her understanding of respiratory concepts, and a loving family — including her fiancé — for supporting her throughout her educational journey. Some of the best encouragement she received, however, came from the people benefiting the most from her enhanced knowledge. "I have also had patients encourage me to keep at it," says Cook. "There is nothing more encouraging than that patient saying thank you or telling you that you did a good job."

Kashnow says he was inspired by his students and wanted to show them the value of increasing their education level by obtaining his own bachelor's degree. His two grandfathers, both of whom lost their lives to lung cancer, were never far from his thoughts, nor was his father, who has COPD. His AS program instructors served as great role models, and so did a supervisor he worked under earlier in his career, who he says taught him how to be an exceptional therapist.

Dawn Aberle appreciates the advancement opportunities that come with her BSRT.

Aberle says she has always been, and continues to be, inspired by therapists who are strong patient advocates and thoughtful and thorough in their critical thinking and the care they deliver to patients. She offers this example of what she

Articulation Agreements Ease the Way to a BSRC/BSRT

Articulation agreements are often reached between two-year colleges and their four-year counterparts to create a path by which students can more easily transition to a four-year institution after earning their associate's degree.

Ozark Technical Community College (OTC) in Springfield, MO, is a good example of how this plays out in respiratory care. "Articulation agreements are agreements between AS or AAS level programs and a BS or BHS level degree completion program," says Program Director Aaron Light, DHSc, RRT, RRT-ACCS. "The agreement spells out what courses can be taken at the AS/AAS institution and transferred to the BS/BHS institution for a degree in respiratory therapy." Dr. Light says OTC currently has two such agreements in place and is working on a couple more, and while he hasn't tracked how many students take advantage of them, he believes it's around 50%. The process helps students make a smooth transition to a BS degree program, which increases the likelihood they will pursue a BS degree, he explains.

Jennifer Anderson, EdD, RRT, RRT-NPS, who heads up the BSRC program at Midwestern State University (MSU) in Wichita Falls, TX, is also a big fan of these agreements. Although she emphasizes that anyone with an RRT is welcome to apply to the RRT-to-BS program at MSU, she says when an articulation agreement is in place — MSU currently has eight of them — she and her colleagues can work more closely with students to ensure they know the course requirements for the BS program. "We like having articulation agreements because it helps make the transfer process easier for students," says Dr. Anderson. "They have guidance and degree plans so that they know exactly what courses they will need to take in order to obtain a BSRC degree."

Recent OTC graduate Samantha Wagner has taken advantage of OTC's articulation agreement with the University of Kansas Medical Center to pursue her bachelor's degree in the profession. She believes the extra two years of education is giving her the tools she will need to think beyond the basic critical care needs of the patient. "I really feel that the OTC program has laid down a solid foundation for my understanding of the respiratory anatomy and physiology, disease processes, and respiratory mechanics," says Wagner. "But so far, my bachelor's program has involved a lot beyond bedside patient care, like ethical dilemmas faced in health care, telehealth, pulmonary rehab, as well as where our profession is and where we want it to go." ■

means by that: "A couple years ago, I attended a state conference and listened to a speaker who was a lung transplant recipient," she says. "He repeatedly credited the respiratory therapist in pulmonary rehab for saving his life. The entire room was in tears."

Lifelong learning

Advanced degrees in respiratory care often open new doors for the therapists who earn them, and they always provide those therapists with additional knowledge they can put to work for the betterment of patient care and their profession.

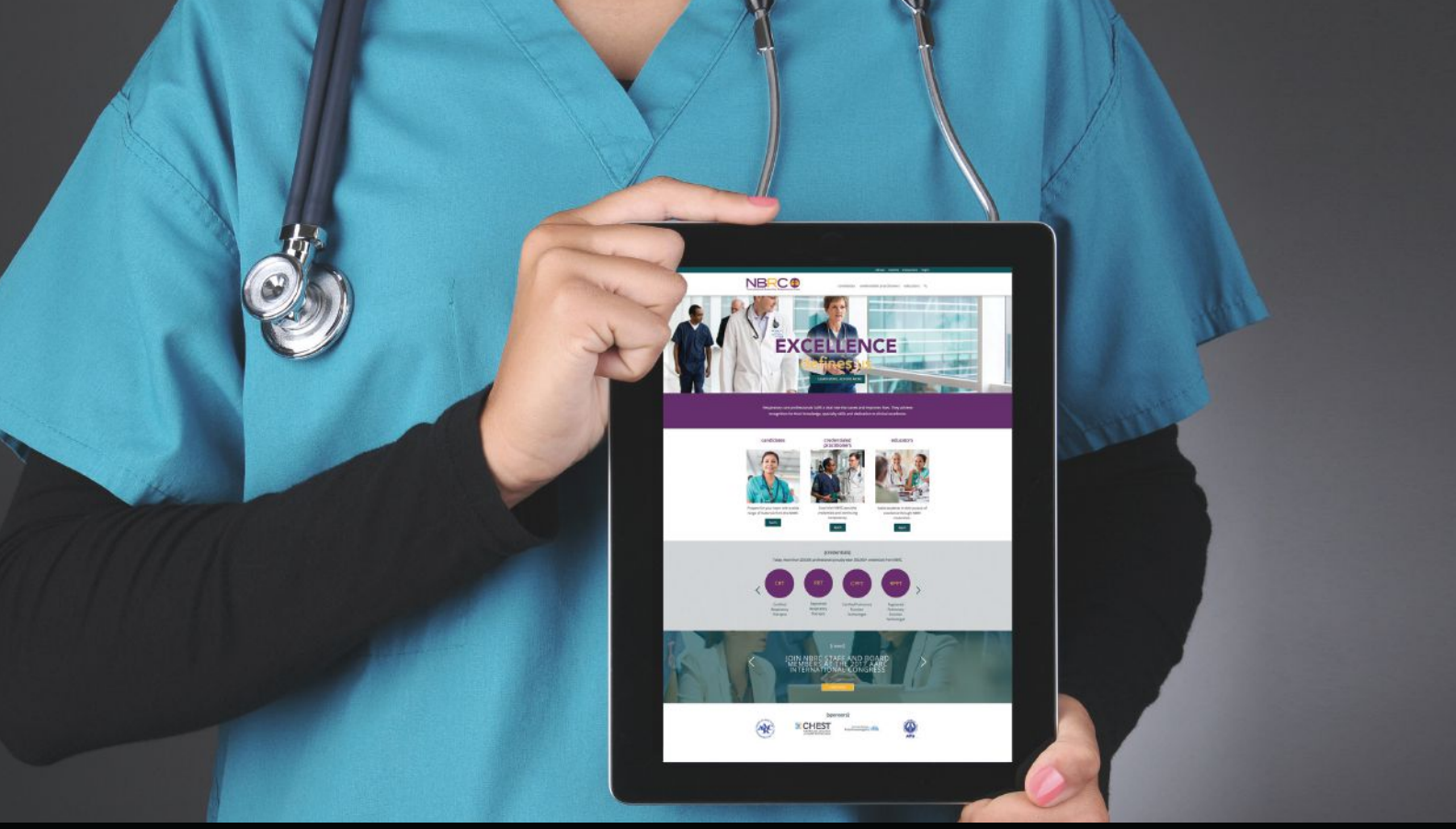
Says Matt Bolinsky, who is about to take his education one step further by entering an MSRC program, "Respiratory care requires continual learning." ■

References

Schneider, A. Driving factors behind the 80% BSN by 2020 initiative. RN.com web site. Available at: https://www.rn.com/headlines-in-health/driving-factors-behind-the-80-percent-bsn-by-2020-initiative *Accessed May 10, 2018.*

Physical Therapist (PT) Education Overview. American Physical Therapy Association web site. Available at: http://www.apta.org/PTEducation/Overview *Accessed May 10, 2018*

Sasha Cook's role on the transport team at her hospital demands a higher level of learning.



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Why RTs Leave, and What Managers Can Do about It

Focused efforts to improve retention in the respiratory care department

by Kyle C. Mahan, MSM, RRT

Creating a respiratory care department with a high staff retention rate is a goal that all managers share. These days, however, developing a staff that is committed and loyal to the department and organization seems to be more the stuff of legend than reality. Health care is facing staffing shortages across the board, and as the demand for respiratory therapists has increased in various sectors, retention rates seem to be dwindling and retaining quality therapists is becoming more of a challenge. Lack of job satisfaction and burnout are leading some therapists to seek other opportunities, and some RTs are turning to nontraditional roles in health care because of their talent and value.

Factors that diminish retention

The baby boomer generation is the largest generation currently alive. In 2006, the U.S. Census reported nearly 80

million baby boomers, and in 2011, the oldest among them became eligible for Medicare.[1] Every month, more than a quarter of a million Americans reach retirement age. This is having an impact on staffing for respiratory therapy and other professions all over the country.[2]

As the largest workforce begins to retire and becomes the largest patient population, respiratory care departments are scrambling to meet the growing needs of patients with chronic diseases. While the AARC reports that the number of RTs has increased significantly, growing by nearly 20% between 2009 and 2014 to more than 170,000 therapists,[3] the demand for RTs is increasing in all 50 states. The supply of RTs is simply not keeping up with demand, and this makes it easy for therapists to hop from job to job if they aren't completely happy where they are now.

Advocacy efforts on behalf of the respiratory care profession have opened new doors for RTs as well, and that's affecting retention, too. RTs are exploring and succeeding in more nontraditional roles. They are working in physicians' offices, for insurance companies, at long-term care facilities, in care management, and other outlets. Therapists have fought for positions that once required a nursing degree, and they have shown organizations that RTs bring value and a unique expertise to the table.

Tired of being overlooked

Because RTs are in high demand and being given greater opportunities to use their skills in new settings, managers in hospitals are challenged with finding new and better ways to keep highly qualified RTs on staff. Professional ambition is highly sought after by leaders, but when they are unable to meet the needs of their staff, their best RTs will look at alternatives. Losing motivated RTs is something no leader wants to see happen, but is a reality for many respiratory departments.

An important area that negatively affects retention in the respiratory care department is job and hospital dissatisfaction. This encompasses many factors. For instance, a lack of leadership within the department can have an impact. Little respect or acknowledgement of RTs, burnout, a lack of professional development, and a lack of departmental vision all play a role in retention.

For many RTs, the prevailing sentiment is that they are often overlooked and ignored by the organizations where they work. Too often, more attention is paid to nursing and

Demand for RTs is increasing, and that means therapists don't have to stick it out in jobs they don't like. Keeping them on board is going to require more than just the offer of a steady paycheck.

other departments within the hospital. Frequently, the impact that respiratory care makes on a patient's life goes unnoticed by hospital leaders, patients, family, and others that RTs come across. This can cause discouragement and have an impact on job satisfaction if left unchecked by leadership.

Hospitals have found themselves having to create financial incentives to recruit and retain therapists. While this is an attractive perk, it alone doesn't do much to improve retention. Incentive and sign-on bonuses do nothing more than recirculate the reservoir of RTs on hand.[4] If an RT feels that his role is not effective at one institution, he is eventually going to look at another.

Seeking greater autonomy

Another issue that can cause a decrease in job satisfaction and retention is a department's lack of autonomy. Auditing and modifying patient care and ensuring appropriate care is provided to patients is something that RTs in general are eager to provide.[5] Therapists often feel they are expected to provide therapy to patients when it is not indicated and they are assigned a workload that is heavy with treatments that are not warranted.

For example, studies have shown that up to 20% of bronchodilators ordered are not clinically indicated.[6] Through implementation of therapist-driven protocols, RTs can provide better care, eliminate unnecessary treatments, save the department and hospital money, and develop greater job satisfaction. In fact, a survey of 500 RTs regarding the use of therapist-driven protocols showed higher job satisfaction and lower turnover when such protocols were utlized.[7]

Generational differences figure into the mix as well. Thirty-six percent of millennials state that they will likely look for a new job opportunity in the next 12 months, compared to 21% of non-millennials.[8] Experts state that it costs companies one to two times an employee's salary to hire, orient, and train a new employee. This encompasses advertising, interviews, loss of productivity, etc.[9]

For many respiratory departments, the budgets for hiring and professional development come from the same pool. When RT departments are continuously having to fill positions, this can have a negative impact on training and developing the therapists who do stay, thus exacerbating the revolving door.

Effective leaders understand how to meet the needs of younger workers and provide meaningful roles for them in their departments. They know how to utilize the strengths that millennials bring to the table. These leaders understand that the millennial employee is not just feeling "entitled," but instead wants to make an impact and have a significant role in the respiratory department.

Kyle C. Mahan, MSM, RRT, is clinical director at Jefferson Community Technical College in Louisville, KY. He is working on doctoral coursework in organizational leadership at Grand Canyon University.

Transformational leadership

Clearly, lack of vision and solely reactionary management can kill retention. Many therapists end up feeling ignored and do not feel they are able to voice their concerns in a meaningful way.[10] A department guided by transformational leadership creates an environment where staff members are comfortable to voice their ideas and concerns. They are encouraged to take risks and to try new things, and this results in increased performance and retention.[11]

Each respiratory care department is unique, and there is no one-size-fits-all solution to the retention issue. Managers must develop a department-specific mission and vision that supports the hospital's mission and vision, but also addresses the unique role of the respiratory department. Promote and execute a purposeful continuing education program. Instead of the mundane annual competencies that are necessary, provide education that will empower RTs to become better clinicians.[10]

Leaders need to be as transparent as possible. Adopt an open-door policy with regard to information. In addition, every hospital department should have a medical director. Make use of this valuable advocate. Many departments use their medical directors simply as figureheads and don't want to bother them with the inner workings of the department. Instead, use them to champion progress and aid in creating a stronger department within the hospital organization.[10]

Managers must address the retirement issue as well. In 2014, 17% of baby boomers claimed to be retired, an increase of 7% from 2010.[2] Looking at the staff on hand

and anticipating pending retirements, it is crucial that department leaders establish a plan of action. Reach out to program directors at schools and see if there is a possibility of sitting on the program's advisory board. Sitting on the advisory board provides a greater opportunity to offer advice on curriculum about protocols and therapy provided, and to help students be more prepared to make the transition from student to graduate.

Finally, if you haven't jumped on the therapist-driven protocol bandwagon yet, do it now. Hospitals that adopt such protocols see greater employee satisfaction and lower costs, while maintaining high-quality care and patient safety.[12] When RTs are equipped to evaluate and assess the need of care, they experience a greater sense of investment in the patient's care. When therapists are empowered to alter and adjust care to patients, they feel more engaged and involved, resulting in an increase in employee satisfaction and improved retention.

Empower your therapists

RTs want their leaders to promote and advance respiratory therapy's impact in the hospital. Showing the respiratory staff, both seasoned and new, that they are valued, heard, and crucial to the hospital and patient's well-being will improve retention, and it will be a testament to respiratory leadership and the climate they can create in trying times. ■

References

1. Wirth CK. Retiring baby boomers bring about new jobs. Health Education Monograph Series 2011;28(1):12-19.
2. Casselman B. What baby boomers' retirement means for the U.S. economy. FiveThirtyEight. Available at: https://fivethirtyeight.com/features/what-baby-boomers-retirement-means-for-the-u-s-economy/ *Accessed April 12, 2018.*
3. American Association of Respiratory Care. AARC respiratory therapist human resource study 2014. Available at: http://www.aarc.org/resources/tools-software/aarc-respiratory-therapist-human-resource-study-2014/ *Accessed April 12, 2018.*
4. Kleinman C. (2004). Leadership: A key strategy in staff nurse retention. J Contin Educ Nurs 2004;35(3):128–132.
5. Orens D. From "inhalation therapy" to protocol-driven care. AARC Times 2016;40(5):55–56.
6. Pierce M, Frazer M, Smith H, Domzalski D, Ross A. Reducing non-clinically indicated bronchodilator therapy on non-ICU floors at UPHS using a therapist driven protocol. Respir Care 2016;61(10):OF33.
7. Metcalf AY, Stoller JK, Habermann M, Fry TD. (2015). Respiratory therapist job perceptions: The impact of protocol use. Respir Care 2015;60(11):1556–1559.
8. Adkins A. Millennials: the job-hopping generation. Gallup. Available at: http://news.gallup.com/businessjournal/191459/millennials-job-hopping-generation.aspx *Accessed April 12, 2018.*
9. Smallwood B, Jones W. Create a magnetic healthcare workplace: Preview of a preconvention workshop on nurse retention for healthcare leaders. Mississippi RN 2002;64(3):1–3.
10. Stoller JK, Kester L, Roberts VT, et al. An analysis of features of respiratory therapy departments that are avid for change. Respir Care 2008;53(7):871–884.
11. Raj R, Srivastava KL. Transformational leadership and innovativeness: The mediating role of organizational learning. J Management Res 2017;17(1):201–219.
12. Stewart KJ. Managing respiratory care: Where is the science? Respir Care 2008;53(7):903.

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The 2018 National Sputum Bowl CHAMPIONSHIP

by Jalynn Venis

Spit and Polish for an All-new Competition

What is it in the human soul that yearns for greatness, strives for excellence, and drives us to battle for recognition and championship? It's simple — the sublime knowledge that we are among the best of the best. In the pantheon of great respiratory therapists, the winners of the National Sputum Bowl — a competition held each year at AARC Congress — stand tall and proud.

The 2018 AARC National Sputum Bowl competition, which will be held in Las Vegas in December, is not for the faint of heart, nor for the shy. And this year, it's not for practitioners either.

Renee Wunderley, BA, RRT, RRT-NPS, is chair of both the National Sputum Bowl Committee and the Pennsylvania Society competition. "In 2018 we're highlighting the students and their energy and passion for the competition," says Wunderley. "This year is a total revamp of what we're used to. We'll get to tailor the Sputum Bowl in a way we never have."

New way to play

The National Sputum Bowl is a redesigned competition for students that is meant to inspire and educate, but it is hardly a formal event. It's a costumed affair where people dance, laugh, let off steam, and cheer for their team.

When the AARC Board of Directors decided to discontinue the practitioner portion of the Sputum Bowl at the 2017 Winter Meeting because of declining participation, the Sputum Bowl Committee recognized an opportunity to create an event that would be more engaging and entertaining for students.

RTs Keith Hopper (left), Tom Gable, and Teri Norell comprised the Idaho team that won the first National Sputum Bowl in 1978.

AARC Congress attendees have enjoyed the fun and excitement of the Sputum Bowl each year.

Those who have been to the event for many years will notice a few changes in the competition format. The Sputum Bowl competition — preliminaries, semifinals, and finals — will be held in its entirety in a single room. Instead of a "Finals Night," the committee plans a more celebratory evening for the third night of Congress that begins with a networking and socializing hour to include music, drinks, and light appetizers. An awards ceremony to recognize the top four teams and the national champion will follow, and then the party begins. Expect entertainment!

It celebrates their accomplishments as winners of their state Sputum Bowl competitions and emerging respiratory care leaders.

Getting to the Sputum Bowl

If you've never participated in a Sputum Bowl competition at either the state or the national level, you may be wondering how student teams are formed and how they prepare for the competitions.

Education and program directors of accredited universities encourage their students to play this "Jeopardy"-style game that pits two teams of three people against each other to see which team can accurately answer respiratory care questions the fastest. The first team to buzz in has 10 seconds to answer the question correctly and score a point. At the end of 10 minutes, whichever team has the highest score wins and advances in the competition. The Sputum Bowl has a long and storied past, and it has played an exciting role in every AARC national convention since the late 1970s.

Student teams compete at the state level first. The team that wins the state title qualifies to go to the national competition. All student contestants must be AARC members to participate. Students competing in the National Sputum Bowl receive a free registration to Congress 2018.

Other than that, getting to the National Sputum Bowl competition is just like getting to Carnegie Hall….

Practice, practice, practice

Albert Moss, MA, RRT, is a program director RCP from Kalamazoo Valley Community College in Michigan who had the thrill of winning the national competitions in 1992 and 2013. He remembers his most recent teammates and their win fondly. Moss, along with Rod Albrecht, Kathy Bedford, and Kristi Holmes, seized the prize in 2013 — but it was the 1992 team that gained notoriety outside of the AARC community.

"In 1992, Homer Engert, Jim Taylor, Bruce Brenn, and I used to go to the Ground Round once a week to practice," he says. "We had cards with questions and answers on them. We figured if two people on the team knew the right answer, we had it. We reached a point where even the waitress knew the answers to some of the questions."

Keith Hopper, PhD, RRT, FAARC, and his team of Tom Gable and Teri Norell, won the first National Sputum Bowl in 1978. He says the original game was developed by Ron Koncher and Jim Fenstermaker to help prepare students for exams. "Being from Idaho, we were terrified of being trampled and humiliated by teams from big-city colleges, so we practiced and studied very hard. What else was there to do in Boise in 1978 besides practice Sputum Bowl questions?"

Although Wunderley never competed in nationals, she knows how nerves can affect participants because they sidelined her in college. "When I competed, stage fright took over and made my mind go blank. I was one of the top students, but when you get up there and see all the people watching you, it plays some big mind games."

Students can avoid such mind games by remembering to have a good time and to enjoy the experience, says Wunderley. For Hopper, being well prepared is paramount. Hopper sums up his best advice for winning with these words: "Study, study, study, then practice, practice, practice."

Hopper says he and Gable published three volumes of questions for state and national competitions, some of which are still in use today, such as: What is the alveolar surface area in the adult? How many milliliters of oxygen can combine with 1 gram of hemoglobin? What is Avogadro's law?

"It's difficult for me to read anything today in respiratory care without automatically forming a potential question," Hopper says. "I consider the refinement of questions to be my unique contribution to the Sputum Bowl."

Winning strategies

Every past participant seems to have had a particular strategy that sets the tone for their contributions. For Wunderley, it's knowing your job. "One person on the team is responsible for watching the time. One is responsible for buzzing. And one member delivers the answer."

Hopper credits his success to sensible shoes. Moss says it's all about the playing as much as the winning — kind of a savor-the-journey approach. Of course, everyone knows great teammates are the key ingredient for any winning strategy.

"Teri had an uncanny knack for buzzing in at precisely the right moment when enough of the question had been read to answer, if you knew the answer," says Hopper. "Then she would relax and look serenely over at Tom and me. We often came up with the answer. Teri was gentle and sweet but she had a vicious competitive streak. She

would not let up even if we were twenty points ahead. I used to sometimes try to take her hand off the buzzer, but she would swat my hand away and get back to the scorched-earth strategy."

Plan to attend now

If you intend to compete in the National Sputum Bowl, Wunderley recommends watching publications and the AARC website for competition details. "Pay attention to the deadlines for application submissions, submitting your rosters, and submitting your 10 visual questions," she says. Visual questions are required from each team and are usually submitted as a PowerPoint file. A visual question might look something like this: a picture of a baby chick, with the answer being PEEP.

Attending the National Sputum Bowl helps practitioners keep their respiratory knowledge current, and it is the best opportunity to network with RTs from around the country. "It's helpful to realize that respiratory therapy is a very small community," says Wunderley.

Meeting others in this community can translate into opportunities at any point in a practitioner's in life.

"The Sputum Bowl is what got me involved in our state society and the AARC," says Moss. "Through the Sputum Bowl, I got to know a lot of other therapists."

Wunderley encourages practitioners to attend the National Sputum Bowl and support the students. "We want them to do their best at the Sputum Bowl and have fun while doing it."

When you're in Las Vegas for the 2018 Congress, enjoy the people, the casinos, and the shows. People say what happens in Vegas, stays in Vegas. But what happens at the convention and, in particular, at the National Sputum Bowl may stay with you for a long, long time to come.

"I have confidence that in 20 years I'll still be able to watch a national Sputum Bowl and remember what an amazing experience it was for me," says Hopper. "I think it says something about the national organization that it has the imagination and grit to implement and maintain something this unique. Sputum Bowl is emblematic of the very best in the respiratory care profession: imagination, innovation, tenacity, a touch of humility, and a sense of humor."

Jalynn Venis is a writer who has edited more than 20 publications, as well as an award-winning screenwriter. ■

Hebron Isayas, Patrick Forsythe, and Cesar Romero of the Texas team won the 2017 Student Sputum Bowl at Nationals.

Committee members have always gotten in on the fun by dressing in elaborate and often wacky costumes to add that special touch to the contest.

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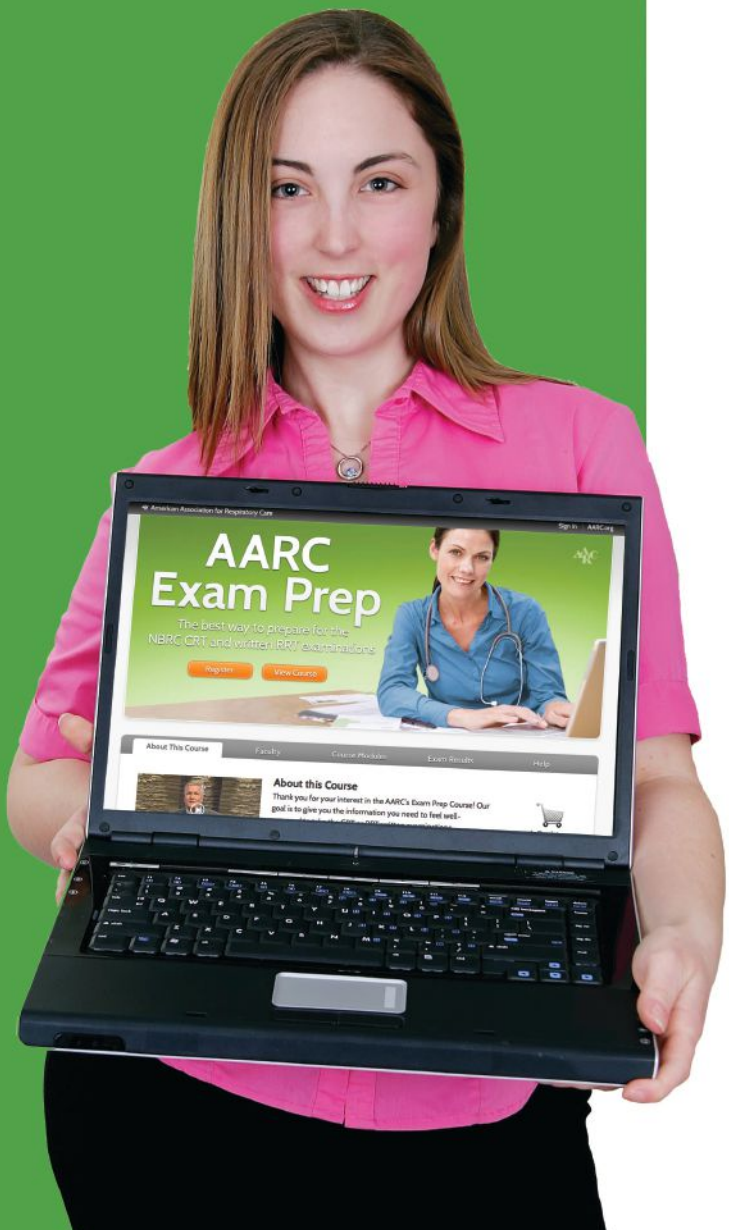

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IN THE NEWS

Annual Event Raises Funds for RT Scholarships and Patient Support

by Renee Delgadillo

About the author: Renee Delgadillo is an RT student at Laurel Technical Institute in Sharon, PA.

Some ran, others walked, but all 200 people in attendance rocked! The Primary Health Network's Charitable Foundation and Laurel Technical Institute (LTI) hosted the fifth annual Shamrock 'n Run family 5k event last March in Sharon, PA. It's always a fun time and raises funds to benefit Primary Health Network patients directly through the Charitable Foundation. It also assists, through scholarships, medical and allied health career students at LTI.

This year's event raised more than $15,000. Some of the funding directly benefits the students of LTI by awarding a yearly scholarship to one deserving respiratory therapy student. LTI students have received awards adding up to $6,000 in scholarships since 2014.

Last year's recipient of the RT scholarship, AARC member Candace Huston, said, "I am very grateful for PHN's Charitable Foundation and LTI affording me the opportunity to follow my dream, and I look forward to continuing to earn this honor by being the great respiratory therapist that LTI has taught me to be." All of LTI's 22 respiratory therapy students attended the event, which has grown in popularity each year. ■

AARC Study Offers Insights into RT Educational Levels

The AARC has issued a goal stating 80% of respiratory therapists should have or be working toward a bachelor's degree by 2020. A new study comparing educational levels of respiratory therapists in the AARC's 2014 Human Resources Study with findings from a survey on educational levels conducted in 2017 suggests progress is being made. Key results from *Comparing Human Resource Study Results from 2014 and 2017* include:

The percentage of respondents reporting a bachelor's degree or higher went from 40.5% in 2014 to 43.2% in 2017.

11.9% of respondents in the associate's degree category in the 2017 survey said they were working on a higher academic degree.

The percentage of respondents who reported that they were pursuing a higher degree to advance their career in respiratory care increased from 2014 to 2017.

Further analysis of the results led the authors to conclude that 55–56% of respondents either had or may have been working toward a bachelor's degree in 2017. The 2014 findings were based on responses from 15,234 respondents. In 2017, 19,281 therapists responded to the survey. ■

Teens Who Smoke or Vape May Be at Higher Risk for Alcoholism

If results from a study conducted in mice bears out in humans, teenagers who take up smoking or vaping may be setting themselves up for an increased risk of becoming alcoholics when they get older. Researchers from the Perelman School of Medicine at the University of Pennsylvania arrived at that conclusion after administering nicotine through daily injections to the animals during adolescence or adulthood, then measuring alcohol self-administration after a delay that allowed the adolescent rats to reach adulthood.

Adolescent, but not adult, nicotine exposure altered the function of the normally inhibitory midbrain circuitry mediated by the neurotransmitter GABA. Specific GABA signals that were normally inhibitory in response to alcohol began to shift toward excitatory. By altering the midbrain "reward-mediating" circuitry of the brain, this shift in alcohol-induced GABA signaling led to a long-lasting enhancement of alcohol self-administration in rats that were given nicotine at a young age. The study was published in a recent edition of *Cell Reports*. ■

Inroads for Predicting TB

Using a four-gene signature found in the blood, researchers publishing in the *American Journal of Respiratory and Critical Care Medicine* report that they can more accurately predict which individuals living with someone with tuberculosis will go on to develop the disease themselves up to two years before they are diagnosed.

Focusing on people who lived with someone with active TB, the research team from Stellenbosch University in South Africa enrolled 4,466 HIV-negative, healthy study participants from the households of 1,098 index cases. Blood samples were taken and stored. At the end of the initial study period, when it was apparent who had progressed to TB and who hadn't, the researchers analyzed the blood samples of 79 individuals who progressed to active TB between three and 24 months after exposure and of 328 individuals who remained healthy during the two years of follow up. ■

New Target for Flu Vaccine, Treatment

A new study from investigators at The Scripps Research Institute suggests antibodies known as IgAs may hold the key to a better flu vaccine, and to better flu treatments as well.

The scientists studied various antibodies in cell cultures to find out which ones were most potent against the flu virus. They found that a subtype called IgA1 was the most effective, and that one part of IgA1 in particular deserved all the credit — specifically, a certain kind of tail on the end of the molecule that blocks the part of the virus that allows it to attach to the cells it wants to infect.

Flu vaccines today generally stimulate antibodies other than IgA, but the investigators believe that, if they could graft this tail onto a more manageable antibody molecule, they could develop a better flu vaccine and flu treatments. "It would combine the best of both worlds and give us a molecule that's more effective and hardy, and that ultimately may be useful in the clinic," notes study author Lars Hangartner, PhD. The study appeared in a recent edition of *Cell Reports*. ■

Multi-Faceted Program Reduces Readmissions

A study conducted among heart attack patients may have implications for chronic respiratory disease patients, too. Pennsylvania researchers found a multi-faceted discharge and follow-up program reduced readmissions by 48%.

The intervention included a consultation with a pharmacist who reconciled the patient's existing medications with the new prescriptions and their potential side effects. A nursing team provided education on best practices for diet, reading materials on the disease, implications for lifestyle changes, and disease management. A care team helped the patient find a primary care physician, planned follow-up visits, and performed a patient check-in call seven days after discharge to answer questions and provide support as needed. The study compared readmissions among 304 patients cared for after the multi-faceted program went into operation with 192 who were discharged before the program was implemented.

"Individually, many of these discharge interventions have not proven effective at decreasing readmission rates," says study author David Whellan. "The multi-faceted approach to education and follow up is really the key." The study was published in a recent edition of the *American Journal of Medical Quality*. ■

SIDS Linked to Unsafe Sleeping Practices Among Friends and Relatives

New parents are strongly advised to place their babies on their backs to sleep to minimize the risk for sudden infant death syndrome (SIDS). They are advised to make sure everyone who might be taking care of the baby also gets that message, report researchers from the University of Virginia.

They reviewed more than 10,000 infant deaths and found that 1,375 occurred when a parent was not present. Among those cases, babies were less likely to be placed on their back and more likely to be placed in sleep environments that were not free of toys, soft bedding, and other hazards. Deaths under the supervision of friends and relatives were most likely to occur while the babies were placed on an adult bed or couch or had objects in the sleep environment. The study appeared in a recent edition of the *Journal of Pediatrics*. ■

Overlooked Protein Could Hold the Key to Better Flu Vaccine

Flu vaccines typically target a protein on the surface of the virus called hemagglutinin that enables the virus to attach to a host's cell membranes and enter that person's cells. Once inside, the virus makes multiple copies of itself, which then burst out of their hijacked cell and infect more cells.

Another protein called neuraminidase also sits on the surface of the virus and enables newly formed viral particles to escape the original cell and infect nearby cells, but current vaccines only rely on small sub-units of the neuraminidase protein, and the current process of inactivating the vaccine seems to destroy the neuraminidase protein.

U.S. researchers believe neuraminidase has a larger role to play. When they tested monoclonal neuraminidase-reactive antibodies collected from unvaccinated mice that were infected with influenza, they found that those antibodies could provide robust protection. Even when given to mice 48 hours after infection with the virus, the neuraminidase-reactive antibodies were effective at levels comparable to the hemagglutinin-reactive antibodies, protecting the mice from a lethal influenza challenge.

"Our results demonstrate that hemagglutinin should no longer be the de-facto target in influenza vaccine development efforts," study author Patrick Wilson, from the University of Chicago, was quoted as saying. "We think including an improved neuraminidase component to future influenza vaccine compositions can reduce the severity of illness and decrease the frequency of community-acquired influenza infections." The study appeared in a recent edition of *Cell.* ■

Thumbs Up!

The AARC gives a big thumbs up to AARC member Felix Khusid, BSRT, RRT, RRT-ACCS, RRT-NPS, FAARC, FCCM, FCCP, ATSF, for his inclusion in the American Thoracic Society's first class of American Thoracic Society Fellows (ATSF). Khusid was the only respiratory therapist in the inaugural class and was recognized along with the other ATSFs at the ATS international conference in May.

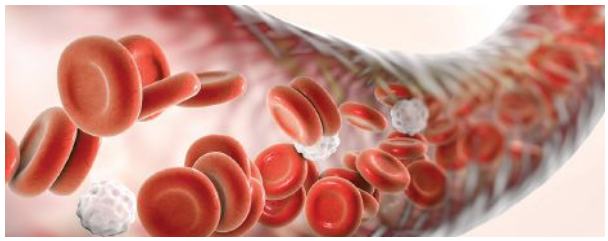
The ATSF designation goes to ATS members "who have demonstrated dedication to the Society and made significant contributions to the fields of pulmonary, critical care, and/or sleep medicine." Khusid is administrative director of respiratory therapy and the Pulmonary Physiology Center at New York Presbyterian Brooklyn Methodist Hospital in Brooklyn, NY. He has presented and published numerous abstracts and research papers related to respiratory care. ■

Airborne Fine Particulate Matter Levels Linked to ALRI

According to Utah researchers publishing in a recent edition of the *American Journal of Respiratory and Critical Care Medicine*, when it comes to airborne fine particular matter (PM2.5), even brief exposure raises the risk for acute lower respiratory infection (ALRI).

The study looked at 146,397 individuals who were treated for ALRI between 1999 and 2016 at Intermountain Healthcare facilities throughout Utah's Wasatch Front, a region bordered on both sides by mountains and including cities in the Salt Lake City, Ogden, and Provo/Orem areas. PM2.5 levels were estimated based on data from air-quality monitoring stations, and short-term periods of elevation were found to match with the timing of increases in health care visits for ALRI.

ALRI was associated with elevated levels of PM2.5 in both children and adults. Newborns and toddlers up to age two represented 77% of those who had an ALRI diagnosis. Seventeen children ages 0–2, nine children ages 3–17, and 81 adults died within 30 days of diagnosis with ALRI. The authors note nearly 60% of U.S. children live in counties with PM2.5 concentrations above air-quality standards. ■



New Hope for Patients with Pulmonary Hypertension

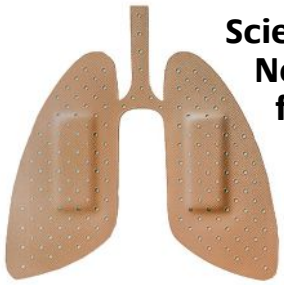
Low oxygen levels in the blood can lead to pulmonary hypertension. Johns Hopkins University researchers believe they have discovered a key reason why this happens — and how to reverse it.

Working with cells from the blood vessels, they found that levels of a protein called KLF15 could drop during a state of reduced oxygen. This causes a series of chain reactions that likely contribute to blood vessel damage and the progression of pulmonary hypertension.

Researchers were able to genetically alter cells grown in a dish to have increased expression of KLF15, effectively reversing the damage and restoring the cells to normal function despite exposure to low oxygen levels. The finding could lead to new treatments for the disease. The authors published their findings in a recent edition of *Arteriosclerosis, Thrombosis, and Vascular Biology*. ■

Vaccine for Peanut Allergy Shows Promise

Researchers from the University of Michigan have shown that a nasal vaccine can turn off the peanut allergy in mice that have the allergy. The vaccine, which redirects how immune cells respond to peanuts, was found to be effective in protecting the mice from allergic reactions two weeks following the final dose. The researchers are now conducting more studies to determine how long the protection may last and are hoping it will lead to long-lasting suppression of allergies. The study was published in a recent edition of the *Journal of Allergy and Clinical Immunology*. ■



Scientists Have a New Drug Target for Idiopathic Pulmonary Fibrosis

A new study out of Cincinnati Children's Hospital Medical Center suggests that a gene called FOXF1 can inhibit the idiopathic pulmonary fibrosis (IPF) disease process. The research began by showing that human lungs from IPF patients and mouse models of IPF lack FOXF1 in myofibroblasts, and then it went on to reveal that cells lacking FOXF1 also exhibit overexpression of a related gene called FOXM1, which drives lung scarring and inflammation.

"The exact cause of IPF is unknown and effective treatments are needed. This study identifies a novel anti-fibrotic drug target that inhibits pulmonary fibrosis in our preclinical models," explains lead investigator Tanya Kalin, MD, PhD. "We are developing different therapeutic approaches and conducting preclinical tests to increase FOXF1 expression in the cells of lung connective tissues." The research was published in *Cell Reports.* ■

Hookah Serves as Entry Point to Smoking for Many Young People

E-cigarettes aren't the only non-traditional form of smoking to be complicating the quit-smoking scenario. In a study published in the *American Journal of Health Behavior*, New York researchers found hookah use is increasing in New Jersey high school students, up from nearly 18% in 2008 to 23.6% in 2014. Past 30-day hookah use in 2014 was about as high as e-cigarette use, 11.8% vs. 12.1%, and higher than other tobacco products. Among all high school students, frequent hookah use increased from 1.6% in 2008 to 2.9%.

A related study from the same investigators, which appeared in *Substance Use & Misuse*, found 25% of 832 college students who reported using a nicotine product said hookah was their entry to smoking. Nearly half of those who had never tried traditional cigarettes said hookah was the first tobacco product they tried.

Study author Jessica Kulak, a postdoctoral fellow at the University at Buffalo, believes these findings suggest that public health agencies should more accurately account for hookah use in their youth surveillance systems. ■

Early Use of Antacids, Antibiotics Linked to Allergies

In the largest study of its kind, military researchers have found that the use of antacids and antibiotics during the first six months of life can increase the risk of allergies in children.

The investigators had retrospectively analyzed the birth records of 792,130 children and then tracked data for them over nearly five years. All of the allergic diseases evaluated were increased in children who had been treated with antacids or antibiotics during the first six months of life, with food and medication allergies, anaphylaxis, and allergic rhinitis most strongly associated with antacid usage. Children exposed to antibiotics were more likely to have developed asthma allergic rhinitis, anaphylaxis, and allergic conjunctivitis.

The authors suggest antibiotics may increase the risk for allergies through an alteration of the bacteria in the intestinal tract, which could potentially affect immune system development. They believe acid-suppressive medications may increase the risk because they reduce protein digestion in the stomach. *JAMA Pediatrics* recently published the study. ■

Mucus Clusters May Determine Sinus Surgery Outcomes

Not all mucus is created equally, according to Vanderbilt University researchers who conducted the first study to use biological markers to identify endotypes of chronic sinusitis in a North American population.

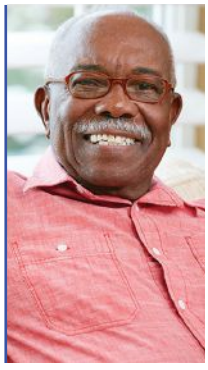
The investigators collected mucus from the nostrils of patients scheduled for sinus surgery to determine whether there were different cytokine profiles in the patients. Six different clusters were seen, and at the one-year follow up after sinus surgery, results showed patients in specific clusters fared significantly better than those in other clusters.

The authors believe these findings may pave the way for personalized medicine for chronic sinusitis patients. "Some patients may be better served with surgery, others with medical treatment," study author Justin Turner, MD, PhD, was quoted as saying. The study was published in a recent edition of the *Journal of Allergy and Clinical Immunology*. ■

Heart-Imaging Drug May Prevent Lung Transplant Rejection

Regadenoson, a drug commonly used to image the hearts of cardiac patients, may one day ward off rejection for lung transplant patients. After decades of research into the area, University of Virginia (UVA) investigators have now launched human testing to find out whether regadenoson could effectively treat the ischemia reperfusion injury so often seen in lung transplant patients.

Ischemia reperfusion injury directly correlates to the development of chronic rejection and is thought to be the reason why five-year survival in lung transplant recipients is only about 50%. The drug will be evaluated in up to 21 patients during the Phase I clinical trial, which is aimed at evaluating the safety of the drug and finding the safest dose. The National Heart, Lung and Blood Institute is collaborating with UVA on the project. ■



Share Your Wisdom

The *AARC Times* "Reflections" column features AARC members who have recently retired from the profession. If that's you, we'd like you to look back at your career or some aspect of it and tell us what it meant to you and why. Start brainstorming some ideas and then submit your story to *AARC Times* Editor Marsha Cathcart at cathcart@aarc.org. ■

Researchers Develop Personalized Risk Assessment Tool for Lung Cancer

Thanks to new screening programs for lung cancer, more patients are being diagnosed in the early stage of the disease. Now researchers from Singapore have harnessed the power of big data to develop a personalized risk assessment tool that can potentially predict patient survival and treatment outcomes of early-stage lung cancer patients.

The tool uses a novel panel of 29 unique extracellular matrix (ECM) genes that play a role in the development of lung cancer. The tool successfully identified early-stage non-small cell lung cancer patients who derived survival benefit from adjuvant chemotherapy.

The gene panel's robust performance in predicting survival outcomes and chemotherapy success rate was validated in more than 2,000 patients, and researchers also determined a common cut-off score for patient stratification. *Nature Communications* recently published the research. ■

New Tool Measures Toxicity of E-Liquid Ingredients

University of North Carolina researchers have developed a system for the rapid evaluation of e-liquid toxicity based on a standard toxicology approach. The system uses large plastic plates arrayed with hundreds of tiny indentations in which fast-growing human cells are exposed to different e-liquids. The more these liquids reduce the cells' growth rates, the greater their toxicity.

In a study published in *PLoS Biology*, investigators found a wide variation in the ingredients in e-cigarette liquids, with some of the ingredients significantly more toxic than others. Most worrying was the finding that, even in the absence of nicotine or flavorings, small doses of the two main ingredients in e-cigarette liquids, propylene glycol and vegetable glycerin, significantly reduced the growth of the test cells. The greatest toxicity effects came from two flavor compounds, vanillin and cinnamaldehyde, which have been widely used in e-liquids. "We have this tool, and it's very fast and reliable, and we now plan to use it on a wider scale," study author Flori Sassano, PhD, was quoted as saying.

"There are more than 7,700 e-liquid products on the market, and regulators as well as ordinary people should know more about the ingredients they contain and how toxic they might be," notes Dr. Sassano. ■

Send Us Your Medical Mission Story

We know many AARC members have reached beyond American borders to provide life-saving care. Now we're hoping you will share your stories with the rest of us through an article in the upcoming *AARC Times* international issue.

We are beginning to collect medical mission stories for the December issue. Preference will be given to submissions describing respiratory care activities of volunteer RTs on medical missions. AARC members who have a medical mission story to share with their colleagues can email *AARC Times* Editor Marsha Cathcart at Cathcart@aarc.org and place "Medical Mission" in the subject line. The submission deadline for this issue is **August 1**. ■

"Transitions" Column Honors AARC Members

The AARC "Transitions" column is devoted to sharing news about the passing of AARC members. You can submit news about your colleagues' recent passing by going to http:c.AARC.org/transitions. Please provide any information about the member's recent obituary so that we can share it with the membership and pay tribute. ■

Students and Seniors Get Price Breaks on Membership Dues

People new to their respiratory care career and those who are getting ready to retire can both benefit from exclusive membership offers developed just for them.

The transitional student membership is available to student members who are preparing to graduate. AARC student members who renew their membership at least 91 days prior to graduation will save the most on dues, but savings are available up to 150 days past graduation. Those nearing graduation should look for an email with specific instructions on how to claim this special membership price break or call AARC Customer Service at (972) 243-2272 to participate.

Members age 65 and older who have been AARC members for at least 20 years are eligible to maintain their membership in the Association for just $25 per year. Alternatively, they can pay $200 and become members for life. This digital membership gives these loyal members the chance to stay in touch with everything going on in the respiratory care industry while they're planning for or entering retirement. Members eligible for the senior status can call AARC Customer Service at (972) 243-2272 to learn more about registering. ■

Calendar of Events

AARC & State Society Programs

July 17 – 19, 2018
Texas Hill Country (near San Antonio)
AARC Summer Forum
Contact: https://www.aarc.org/aarc-meetings/summer-forum-2018/

August 13, 2018 – August 14, 2018
Columbus, Ohio
2018 OSRC Annual Conference
Contact: staff@pacainc.com or www.osrc.org

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