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Michael Amato Receives 2019 Garza Award

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Michael Amato Envisions a "Global Community" for RTs

Our 2019 Hector Leon Garza MD International Award winner shares his passion for the worldwide integration of respiratory care

by Debbie Bunch

As the long-time chair of the Board of Trustees at the American Respiratory Care Foundation (ARCF), Michael Amato, MBA, has been supporting the profession of respiratory care for decades now, and nowhere is that truer than in the international arena. The pharmaceutical executive at InspiRx played an integral role in helping move many of the key international efforts of the Foundation and the AARC forward, and he has served as a Governor at Large on the International Council for Respiratory Care (ICRC) for the past 20 years. He was the first recipient of the Toshihiko Koga MD International Medal awarded by the ICRC, and he has also received Life Membership in the AARC.

In this interview, Amato explains how his passion for international respiratory care came about and elaborates on all the ways he has worked to foster a greater understanding and exchange of information among respiratory professionals around the world.

You have served as chair of the ARCF Board of Trustees for many years, and as such have been present for the Foundation's foray into the international arena. Why did you think it was important for the Foundation to get involved internationally?

I thought it was quite important that the ARCF support the global expansion of respiratory care, and, in particular, that the AARC be the organization for other countries to model their profession after.

What has fueled your own personal passion for international respiratory care, and how do you believe fostering a greater sharing of research and information across borders enhances direct patient care for people with pulmonary disorders, both here in the United States and abroad?

I sat down with Jerome Sullivan when he was AARC president and listened to the passion he had for wanting the AARC to formulate a strategic plan for sharing the AARC's ideals with other countries. He wanted to impart what we had learned and were learning in the many areas of patient care and hoped that a sharing of our experiences would help people with pulmonary disease. I might add that we also felt that other countries' experiences would benefit us in the sharing of each country's practices. I strongly

felt that our world was getting smaller and that we could become a "global community" in the fight against pulmonary disease, which could only benefit the patient, no matter what the country.

The International Fellowship Program has been integral to the AARC's efforts to open up the lines of communication between American RTs and providers in other countries. How have you supported this program, and why do you think it was important to do so?

There was never any question in my mind, or in my leadership role at the Foundation, that bringing qualified respiratory practitioners from other countries — and specifically the emerging nations hungry to apply our American respiratory practice to their specific countries — would serve the goals of the AARC's international program. I have made certain that the ARCF always ensured that the funds were there to support bringing candidates to the United States to expose them to our great respiratory programs across the country, and then have them attend the annual Congress. I served on the AARC's International Committee for a number of years so I could report firsthand to the ARCF Board of Trustees how vital supporting this program was and is.

The International Council for Respiratory Care grew out of these efforts, and you have served as a Governor at Large on the ICRC for 20 years now. What are some of the key roles you have played in the ICRC, and how do you believe the ICRC is promoting greater understanding of respiratory care around the world?

It has been one of my great honors to continue to serve the Council and to have watched the growth of the many countries and the high quality of the individual governors. I have had a small part in seeing that the leadership of the ICRC always received the support of the ARCF, and I have been privileged to lend my voice in support of the many innovative ideas that these country governors have implemented in their respective countries to bring excellent patient care home with them.

What are some of the other ways you have supported international respiratory care, and what have you gotten, both personally and professionally, out of your involvement with these efforts?

I have the distinct pleasure of being the individual to have started the original funding for the Garza Award, understanding that the profession needed to recognize individuals who promoted respiratory care throughout the world — who gave of their time and efforts in the international community. I also supported the naming of this prestigious award after Dr. Hector Leon Garza, as I don't know another individual who has better lived the ideals of international respiratory care every day. I think the benefits I have gotten out of this experience have been mostly personal, having been involved from the very beginning of the international strategy and to have watched it grow and prosper. It is something I am very grateful for.

Where do you think you've made the most impact on international respiratory care and why?

I hope I have, in some small way, impacted international respiratory care in a quiet, behind-the-scenes fashion to ensure that the ARCF is a leading organization in supporting these efforts, and speaking up whenever I felt the international community, and specifically the ICRC, needed a voice in ensuring all the support it needed to continue to spread the message of better patient care around the globe.

Respiratory care continues to be delivered by a range of health care providers in countries around the world. How do you believe these diverse providers — including RTs here in the United States — can best come together to improve care for patients with respiratory conditions, and why is it important for them to do so?

I think you've answered the question quite nicely Because there are so many variables in delivering quality respiratory care, it is more important that there be a sharing of information, education, research, and practice amongst every country, including the United States, to ensure that the role of the respiratory care practitioner continues to grow in importance, and that good standards of practice be available everywhere. I think it is so important to continue to expand the Fellowship Program, which I think is one of the best ways to bring global respiratory care together. Indeed, we have now gone an additional step in expanding the Fellowship Program with the inception of the "VIP" program, which identifies a specific individual in a specific country who has the power to affect change in her or his country by adopting specific programs that they have seen here in the United States and bringing them back to their country. I believe this program, currently in its infancy, will become a very important part of the international strategy.

What did you think when you learned you would be the 2019 recipient of the Garza Award, and what would you like RTs to know about the importance of international research and collaboration?

I was quite humbled when I was told about being among the many past recipients of this award. As I mentioned earlier, I have had the great fortune to have known Dr. Garza, both professionally and even more so from a very personal perspective, and to receive his named award is something I will always take pride in. I never started this journey expecting an award but rather the good fortune to see international respiratory care grow within the AARC. As for RTs knowing the importance of international research, I think all they have to do is see how many international abstracts are presented at the Congress and, even more so, the number of research projects being reported in RESPIRATORY CARE by international researchers. That is something we should all be proud of.

RC Week Goes International

Therapists in India and Yemen celebrated big time last fall

by Debbie Bunch

National Respiratory Care Week was established in the United States to recognize the contributions respiratory therapists make to the health care system. But RC Week isn't just for American RTs anymore. Countries around the world celebrate it as well. Here are two great examples.

India

Students packed the house for several presentations made by leaders in respiratory care in India.

The department of respiratory therapy at Manipal Academy of Higher Education marked the 2019 RC Week with a two-day program held Oct. 25 and 26.

"The purpose of the Respiratory Care Week event was to foster learning through arts and cultural events among the respiratory therapy students and to thank all health professionals supporting the profession for their contributions," said Ramesh Unnikrishnan, MSc, CRT, RT program director at the university. "Over 120 students from the department of respiratory therapy were in attendance."

Day one of the event featured talks on the history of RC Week and the importance of the profession, along with a poster competition among the students and the chance to take part in some creative activities.

“The atmosphere in the hall during the post-lunch session was electric with competitions such as singing, dancing, and mime,” said Binoy Kuriakose, MSc, RT, faculty in respiratory therapy and the coordinator of the event.

Preliminary rounds for the department’s annual quiz competition took place, too.
On day two, students had the chance to engage with respiratory therapy students from Kasturba Medical College in Mangalore, and everyone enjoyed the final rounds of the quiz competition.

The Indian celebrations included a range of competitions, from drawing and cartooning to singing, dancing, and mime.

“The post-lunch session on day two was insightful and informative, with two very significant people who were instrumental in setting up and nurturing respiratory therapy education in India honoring us with their presence,” Kuriakose said.

Dr. Ramkumar Venkateshwaran, who Kuriakose says is often lovingly referred to as the “father of respiratory therapy in India,” shared his experiences from the early days of the RT program in Manipal. Dr. Anitha Nileshwar, a former head of the department, inspired the students with a talk that stressed the importance of research in the field.

Awards were part of the celebrations in India.

Kuriakose says the feedback from the students who attended the event was overwhelmingly positive.
“It was a well-received program and all the students expressed their desire to celebrate RC Week in the coming years,” Kuriakose said.

Yemen

More than 300 health professionals, including respiratory therapists, physicians, nurses, physiotherapists, and medical students, gathered on Oct. 26 for a Scientific Day sponsored by the Yemen Bilquis Medical Institute and Modern European Hospital in honor of RC Week. Held by the Respiratory

Care Services Administration at Modern European Hospital, in cooperation with the University of Science and Technology Hospital, the event featured scientific lectures divided into two sessions moderated by cardiologists and pulmonologists.

2019 marked the second year in a row for Yemeni RTs to come together for RC Week.

After the event, the 2019 Respiratory Therapist of the Year Award was given to Saleem Hamilah, BS, RCP, for his outstanding efforts to improve and increase awareness of the respiratory care specialty in his country. Hamilah, who currently serves as executive director of the Respiratory Care Services Administration, was also recognized for the role he played in developing the "National Guide of Respiratory Care Services in Governmental & Private Hospitals," now considered a key document governing the profession in Yemen.

Everyone at the Yemeni festivities enjoyed this "RC Week 19" cake..

This was the second year the Yemeni facilities hosted an RC Week event, and only the fourth year since the RT program was started at the Bilquis Medical Institute. According to Saleem Hamilah, it's all part of an ongoing effort in his nation to advance the profession of respiratory care.

As he told us after the inaugural program in 2018, "One of our future goals is to initiate the bachelor of science in respiratory care and establish the Yemeni Association for Respiratory Care."

RTs in Yemen celebrated RC Week 2019 with a special Scientific Day featuring lectures moderated by cardiologists and pulmonologists.

More to come

Both international RC Week events make it clear that countries around the globe embrace this annual celebration of the profession. With more and more nations developing respiratory care professions of their own, the trend is only likely to continue.

The Global Perspective

How nations around the world are advancing the practice of respiratory care

by Debbie Bunch

Everyone on the planet breathes air in and breathes air out, and no one is immune from problems related to the respiratory system. For the lucky among us, this might only mean a chest cold now and then, but for many others it extends to serious acute or chronic challenges that require expert care from clinicians specialized in the treatment of pulmonary disease. The AARC has been working with respiratory professionals around the world for decades now to ensure a fluid exchange of information between these professionals. How is the profession being practiced in other nations today? Five countries from different parts of the world explain their system and how they are refining it for the benefit of patients.

Republic of China

In the Republic of China — more commonly known as Taiwan — respiratory care has been provided by respiratory therapists since the 1970s, but the profession wasn't formalized by the government until 2002 when the president of the country announced the Respiratory Therapist's Law that made the profession a distinct medical specialty.

"The respiratory therapist must be graduated from the university, and certified by the national examination," said Chin-Jung Liu, MS, RRT, International Council for Respiratory Care (ICRC) Governor for Taiwan. "Obtaining a respiratory therapist license for clinical work requires practice registration and 120 continuing education credits every six years to renew the practice license."

Liu says RTs in her country promote clinical practice based on evidence-based medicine and strengthen the authenticity of learning via Entrustable Professional Activities. School programs are evaluated every three years by the Ministry of Education, and hospital departments undergo an assessment by the Joint Commission of Taiwan. According to Liu, RTs are trained in areas from the clinic to teaching and research, and their aim is to promote the profession and protect patient safety and rights.

She believes working across borders benefits respiratory professionals and patients on a number of levels.

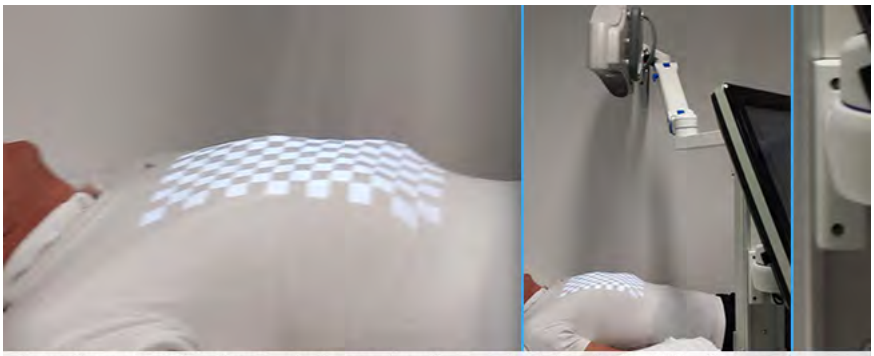
“Only through international exchanges can our rich experience help countries that have not yet started the profession, so that the medical standards of local people can be improved, and safety can be guaranteed,” she said.

She cites two great examples from her own country’s experience: the Respiratory Care Association of Republic of China’s work with Mainland China to advance the profession, and the recent passage of a respiratory therapy act in the Philippines that will make that nation the second in Asia to declare respiratory therapy a formal medical profession.

“We are also actively participating in the ICRC every year to share the status of respiratory therapy professional development in Taiwan,” she said. “We absorb the culture and customs of different countries through international exchanges.”

United Kingdom

Thanks to the founding strategy adopted by the National Health Service (NHS) in the United Kingdom over 70 years ago, respiratory treatments at the point of delivery have always been free of charge to all U.K. citizens. According to ICRC Governor for England Professor Brendan Cooper, PhD, CBiol, MIBiol, FERS, FRSB, the latest strategy, called the NHS England Long-Term Plan, includes diagnostics as well.



According to Brendan Cooper, the future of respiratory physiology in the UK is all about new innovations, as depicted by this picture of a subject having their breathing measured by structured light plethysmography.

“As a result of the increased use of innovation and technology, more respiratory care is planned to be delivered in the community rather than hospitals,” he noted.

Multidisciplinary teams are considered paramount to the success of the plan and future UK health care. In his country, these teams include respiratory physiotherapists, who deliver treatments and assist in the management of mechanical ventilation, and lung function professionals, who handle the diagnostics side of the equation.

“Several senior scientists are Consultant Grade and see patients in many clinics — e.g., sleep, oxygen, noninvasive ventilation, etc.,” he continued. “The blurring of professional boundaries, including doing traditional doctors’ roles, is the way forward in the U.K.”

Prof. Cooper believes this system works well for his country.

“We need a flexible workforce for different sizes and types of hospitals and health care systems,” he said. “We have a ‘get it right the first time’ approach to respiratory services, which are shared with all health care practitioners.”

This is especially essential given the fact that the United Kingdom has universal health care coverage and services that are standardized across the four nations: England, Scotland, Wales, and Northern Ireland. Prof. Cooper also notes that his country spends only 33% of what the United States spends in terms of gross domestic product on health care and has arguably better outcomes in more areas.

“Our poor get treatment irrespective of ability to pay,” he said.

Prof. Cooper emphasized that most respiratory services in England work to national professional standards as well, and that many of the ideas in the new NHS strategy are now being adopted in Scotland, Wales, and Northern Ireland, too.

Collaborating with colleagues from around the globe is vital to maintaining this level of success, says Prof. Cooper. Respiratory professionals in the United Kingdom reach out to their peers through their attendance at international conferences, most particularly the conference held annually by the European Respiratory Society, but also meetings held by the AARC and the American Thoracic Society.

“In an often-divided world, we believe that sharing health care knowledge and experience is a fundamental human right and must not be exploited by others who wish to solely make financial gain from this right,” Prof. Cooper said.

Canada

Respiratory therapy faculty and students from Fanshaw College in London, Ontario, traveled to Guatemala for a service learning mission in June 2019.

Our neighbor to the north can trace its respiratory care profession back to 1964, when pioneers in the field came together as the Montreal chapter of the American Association of Inhalation Therapy, the precursor to the AARC. Today that first chapter has evolved into the Canadian Society for Respiratory Therapists (CSRT), and there are now more than 12,000 RTs in the country who receive training at 22 institutions of higher learning that offer three-year diploma programs or four-year degrees. Canadian RTs enter practice after the successful completion of the Canadian Board for Respiratory Care national examination. Like their colleagues in the United States, they have seen much progress in their scope of practice.

“Over the past 55 years, the profession has evolved from one that is focused on fulfilling primarily technical roles in hospitals to one that sees respiratory therapists as instrumental members of interprofessional care teams across the health care system,” said Andrew West, EdD, FCSRT, chief executive officer of the CSRT and ICRC Governor for Canada. “The evolution continues every day, and we now see respiratory therapists breaking barriers to provide leadership in nontraditional practice settings such as patient safety, innovation, and research.”

The CSRT is working to ensure barriers continue to be broken by promoting a baccalaureate degree as entry to practice, similar to efforts underway here in the United States.

CSRT CEO Dr. Andrew West and CSRT Director of Professional Practice Carolyn McCoy were presented with the first-ever honorary lifetime memberships in the Association of Respiratory Care Practitioners of the Philippines in Manila in July 2019.

"The CSRT believes that respiratory therapists must have the necessary knowledge, skills, and professional judgment to provide safe and effective patient care," Dr. West said. "Paramount to achieving this aim is ensuring that respiratory therapists are scholarly practitioners who are equipped to provide patients with care that is based on the best available evidence, while drawing from their clinical expertise and integrating the preferences of patients and families. The CSRT contends that achievement of a baccalaureate degree level of education is essential to meet the competency requirements associated with scholarly practice."

The Canadian organization is committed to sharing its experiences and expertise with colleagues around the world through its efforts with the ICRC and other nations.

"Understanding best respiratory care practices is not the sole purview of any one nation or community," Dr. West said. "It is through dialogue, the exchange of ideas, and collaboration that practice can be challenged and grown. The CSRT has been a longstanding member of the ICRC and sees this community as an integral meeting point at which these aims can be achieved."

Currently, the CSRT is working closely with the Association of Respiratory Care Professionals of the Philippines to share resources aimed at developing international practice and standards comparators between the two countries that will advance the practice of the profession.

"The CSRT is excited for the opportunities such collaborations can produce for respiratory therapy," Dr. West said.

Saudi Arabia

In Saudi Arabia, respiratory therapists are well recognized as being essential to the health care system, and all hospitals seeking accreditation must employ respiratory therapists in their facilities. Advancing educational requirements for these RTs has long been a goal, and now it is one that has come to fruition.

"The respiratory care education is well improved, and now the entry level of practice in respiratory care is the bachelor's," said Mohammed AlAhmari, PhD, RRT, CTTS, FAARC, FCCP, ICRC Governor for the country. "All respiratory care programs in Saudi Arabia — more than 14 — are bachelor's [degree programs] and there are no more diploma programs in respiratory care."

That major achievement is a reflection of the nation's long-standing commitment to the profession, and it is now being complimented by the establishment of the first-ever postgraduate residency program in

critical respiratory care for clinicians in the field. A fellowship in respiratory care, at the consultant rank, is in the works as well.

“This is a global achievement in respiratory care,” Dr. AlAhmari said.

Dr. AlAhmari notes that the Saudi Arabian profession was modeled after the U.S. profession, and therapists in his country are dedicated to promoting a robust exchange of information and ideas with countries around the world.

“I believe it is important to work with other countries, in particular Gulf countries and others in Asian countries,” he said.

Dr. AlAhmari was personally involved in helping the United Arab Emirates launch their first bachelor’s degree program at Khawarizmi International College last September, and he is now working with Yemen to develop their respiratory care curriculum. He has worked closely with colleagues in India to standardize and improve their curriculum and the profession there as well, and he says other trials and workshops are underway to help additional nations on their journey toward a respiratory care profession of their own.

Italy

Maurizio Sommariva, PT, trains attendees in Italy using a lung simulator during the fifth edition of the NIV training course sponsored by MedicAir Italia.

Bringing a greater level of consistency to the practice of respiratory care is on the radar screen in Italy.

“The practice of respiratory care dramatically differs from region to region and from hospital to hospital in Italy,” said Simone Gambazza, MSc, PT, who is the ICRC Governor for Italy, on behalf of the Associazione Riabilitatori dell’Insufficienza Respiratoria (ARIR) board of directors. “In some acute settings, respiratory care is delivered by nurses, in others by general physiotherapists or respiratory physiotherapists, and in some other cases by medical doctors only.”

The variation is in part due to the typical variation in facilities seen across many countries.

“We have high-level teaching facilities and high-level general hospitals but also small facilities outside the big city centers, where quality of care could be a matter of concern,” he noted.

To address these issues, the Ministry of Education, University and Research has, with the support of the ARIR, initiated the development of a postgraduate master’s degree in cardiorespiratory and critical area physiotherapy. Dr. Gambazza says this degree would recognize respiratory physiotherapists as experts and is in line with the country’s new National Labor Contract, which has extended the terms “specialist” and “expert” to allied professionals.

“We hope that the postgraduate master’s [degree] will allow many physiotherapists to obtain career advancements,” he said.

Another positive move in the country is the “Strategic Guidance Document for the Integrated Management of Respiratory Failure,” which was published by the Global Alliance for Respiratory Diseases Italia in July 2019. The document fits well with Italy’s National Plan of Prevention and National Plan of Chronicity and is designed to more properly address the diagnosis, therapy, and rehabilitation of those with chronic disease. Respiratory physiotherapists are specifically noted as clinicians who should be involved in the program.

However, a recent Ministerial Decree, “Guidelines for Identifying Appropriate Paths in the Rehabilitation Network,” is hampering the efforts of Italian clinicians to ensure more patients with chronic respiratory conditions receive pulmonary rehabilitation.

“If accepted, this document penalizes the scarce and poorly distributed availability and access to pulmonary rehabilitation programs by setting the maximum number of hospitalizations to 20% for those patients who experience exacerbation at home,” Dr. Gambazza said. “In other words, only patients discharged from the hospital might be able to jump into a rehabilitation program right away.”

He goes on to note the document also fails to include rehabilitation services offered at home or in the community, in effect denying a therapeutic intervention whose effectiveness has been demonstrated at the highest level of evidence.

Respiratory therapy faculty and students from Fanshaw College in London, Ontario, traveled to Guatemala for a service learning mission in June 2019.

Dr. Gambazza and his colleagues look forward to the day when there will be shared common competencies and skills between respiratory professionals around the world, along with similar autonomy for these professionals on the job and similar salaries and recognition.

“Eventually, this could promote best and equal treatments for patients, no matter where they are from,” he said.

Clinicians in the ARIR — which he notes is an AARC international affiliate — are doing their part to reach that goal by partnering with organizations like the AARC, ERS, and European Respiratory Care Association to facilitate the exchange of information on everything from new technologies and treatments to hospital models of practice.

“Working together will help spread out the advantages of respiratory care toward a generalist practice and push therefore the role and the presence of the respiratory therapists, even in the remote areas,” he said. “Our greatest hope for the near future is being able to promote educational exchange and international opportunities to keep on feeding the profession and the practice of respiratory therapy.”

Dedicated professionals make a difference

Whether delivered by respiratory therapists, respiratory physiotherapists, or other clinicians specializing in the respiratory system, respiratory care is essential to the health and well-being of all people. As the experiences of these nations show, the practice of respiratory care is flourishing around the world, and much of the progress must be attributed to the increasing willingness of these clinicians to work across borders. By furthering a global perspective on respiratory care, they are ensuring more people in more places receive the care they need for their lung conditions.

Oxygen Saturation Index: A New Predictor for Respiratory Failure?

by John Emberger, RRT, RRT-ACCS, FAARC, CPHQ

There are several commonly used severity scoring systems used for critically ill patients. These systems are complex and require large amounts of data for the score. There are also simpler indexes, such as the P_{aO2}/F_{iO2} ratio and the oxygen index, that can be used to more quickly and easily assess patients at the bedside. These scoring system and indexes all rely on arterial blood gas assessment. Due to the push to move to noninvasive assessment, indexes using pulse oximetry instead of arterial blood gases have been studied, and some show promise. Respiratory therapists should be knowledgeable about these scoring systems and indexes because they can help guide care and manage the critical care population.

Severity scoring systems

Scoring systems for the critically ill have been around for nearly 40 years, and the goal of these systems is outcomes prediction.[1,2] They typically use demographic, chronic disease, acute disease, and physiologic data.[1,2] These scoring systems have minimal usefulness for directing the real-time patient care.[1,2] They have been used for several different purposes in addition to outcomes prediction, and they can provide the ability to compare outcomes and performance of ICUs.[1,2] They have also been used to evaluate staffing needs in the ICU, typically related to the staffing of the nurses.[3] Researchers can use the scores to demonstrate the case-mix between groups, ie, to verify that patient populations are either similar or different.[3]

The most prevalent systems are the Acute Physiologic and Chronic Health Evaluation (APACHE), the Mortality Prediction Model (MPM), the Simplified Acute Physiologic Score (SAPS),[1] and the Sequential (sepsis-related) Organ Failure Assessment (SOFA).[4]

The APACHE has undergone three revisions, making the current system is APACHE IV. There are 129 variables that are assessed in the initial day in the ICU. The APACHE score range is 0 to 286; the higher the number, the more severe the patient's condition and the more likely a poor outcome. The APACHE score also predicts hospital length of stay. Although APACHE is the most comprehensive scoring system, its disadvantages include the complex data collection and a large burden of data abstraction.[2]

The MPM has had two revisions, and the current model is MPM III. MPM is based on data values that are present or absent, as opposed to continuous data values. The score range of MPM is 0 to 14; higher scores indicate increased severity and increased likelihood of a poor outcome. MPM does not predict hospital

length of stay. The major advantages of MPM include the least amount of data abstraction, less chance for interobserver variability, and fewer labs to collect and abstract.[2]

The SAPS 3 is the current version of the SAPS system. SAPS analyzes 21 categories, including six lab values, and uses the poorest values for each collected in the first day in the intensive care unit. The SAPS 3 scores range from 0 to 160. The higher the score, the more severe the patient's condition and the more likely there will be a poor outcome. SAPS also predicts hospital length of stay.

The SOFA was initiated in 1996, and it examines the function of six organ systems: respiratory, coagulation, cardiovascular, liver, central nervous, and renal.[5] SOFA was originally designed to assess sequential organ failure, not outcomes.[6] SOFA scores range from 0 to 24, with higher scores being more severe. SOFA scores have been found to correlate to patient mortality in the hospital but not length of stay in the hospital.[4]

Acute respiratory indexes

All of the above scoring systems, except for the MPM, include the P_{aO2}/F_{iO2} ratio as part of their scoring. The P_{aO2}/F_{iO2} ratio by itself has been reported to predict mortality in critically ill adult patients.[7] With the increasing interest in noninvasive procedures and the drive to reduce blood draws, there has been increasing interest and publications using S_{pO2} as a substitute for P_{aO2}. S_{pO2} is a readily available data point, in contrast to P_{aO2}, which is invasive and more resource-intensive. If S_{pO2} is used as a surrogate for P_{aO2}, values greater than 97% should be disregarded to maximize the linear range of the oxyhemoglobin curve.[8-11]

There have been several studies using S_{pO2}/F_{iO2} ratio. The S_{pO2}/F_{iO2} ratio of patients within the first six hours of admission has been reported to be an indicator of early ARDS in patients who are at risk for developing ARDS.[8] It has been shown that the S_{pO2}/F_{iO2} ratio can be used in place of the P_{aO2}/F_{iO2} ratio in the pediatric ICU, which is advantageous for smaller patients to reduce blood draws.[12] A study in adults showed that the S_{pO2}/F_{iO2} ratio can be substituted for the P_{aO2}/F_{iO2} ratio.[9] Another study of adults with acute lung injury or ARDS demonstrated that the S_{pO2}/F_{iO2} ratio correlated with the P_{aO2}/F_{iO2} ratio, such that 235 and 315 for the S_{pO2}/F_{iO2} ratio correlated to 200 and 300 for the P_{aO2}/F_{iO2} ratio.[10] The readily available S_{pO2}/F_{iO2} ratio can be considered an accurate surrogate for P_{aO2}/F_{iO2} ratio.[10]

Oxygen index and oxygen saturation index

The oxygen index includes mean airway pressure (MAP) in addition to P_{aO2} and F_{iO2}. It is calculated as $(MAP \times F_{iO2})/P_{aO2}$. The oxygen index has been studied as a predictor of outcome as well. It likely depicts ARDS severity more accurately than the P_{aO2}/F_{iO2} ratio, but both methods require an arterial blood gas draw.[11] Frequent blood draws can cause anemia, a need for transfusion, risk of infection, and higher health care costs.[11] An early noninvasive method that is easily calculated with readily available data that correlates to patient outcome is desirable for mechanically ventilated patients in the ICU. The combination of the push for noninvasive monitoring and reports that S_{pO2} may be an accurate surrogate for P_{aO2}, the oxygen saturation index (OSI) was developed as a noninvasive version of the oxygen index. The OSI is calculated as $(MAP \times F_{iO2})/S_{pO2}$. This uses values that are continuously available in the intensive care setting.

OSI: What is the evidence?

There is currently limited evidence concerning OSI but it has been studied in neonates, pediatrics and adults. In a retrospective study of 74 ventilated neonates with severe hypoxemic respiratory failure, OSI was shown to correlate significantly with the oxygen index in that population.[13] A study including 1,833

pediatrics receiving mechanical ventilation retrospectively analyzed the S_{pO2}/F_{iO2} ratio, P_{aO2}/F_{iO2} ratio, the oxygen index and OSI in conjunction with Berlin definition of ARDS. They found that the S_{pO2}/F_{iO2} ratio and the OSI predict mortality as effectively as the P_{aO2}/F_{iO2} ratio and the oxygen index.[8] A retrospective study including 101 adults receiving mechanical ventilation with ARDS examined OSI. In that study, OSI was shown to significantly correlate to outcomes in ARDS patient and was more effective than P_{aO2}/F_{iO2} ratio and the oxygen index.[14]

The only prospective study on OSI included 329 adult patients who met the Berlin definition of ARDS by day four in the ICU. In this study, investigators reported that OSI correlated with the oxygen index in a population of ARDS patients.[11] They also noted that OSI was significantly associated with mortality in patients with ARDS and was a superior predictor compared to the P_{aO2}/F_{iO2} ratio.[11]

At our institution, we retrospectively reviewed 2,870 patients receiving mechanical ventilation for more than 48 hours. We noted that, if a critically ill patient had a higher OSI on day two than on day one, their mortality rate was significantly higher than patients with an OSI value that was lower on day two.[15] The evidence for OSI is weak because there is only one prospective study on the topic.

Role of the respiratory therapist

Because respiratory therapists are intimately involved with patients on mechanical ventilation, arterial blood gases, and pulse oximetry, we are uniquely positioned to understand these concepts and identify patients with ARDS or at high risk to develop ARDS. A basic understanding of these scoring systems and indexes can help the respiratory therapist realize the implications of patient severity when reading a scientific journal article or in understanding the population in their own ICUs. Although many of these systems are not used for real-time patient management, some of these may be relied upon more in the future to identify patients who need ultraprotective ventilation or other alternative treatments such as extracorporeal therapy.

Summary

Systems such as the APACHE, the MPM, the SAPS, and the SOFA rely on large amounts of data and lab values for scoring of severity. These systems cannot be used in real-time management but can help identify the severity of populations, ICU performance, and prediction of patient outcomes. Simpler indexes such as P_{aO2}/F_{iO2} ratio and the oxygen index can be more quickly and easily used at the bedside for consideration of patient management through care algorithms. With the push to reduce blood draws, including arterial blood gases, noninvasive versions of these indexes are being researched. Although they have not been researched fully, the use of these noninvasive physiologic indexes appears promising. Respiratory therapists who work ICUs should be sure to stay familiar with these scoring systems and indexes to understand and manage their patient populations.

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The Most Misunderstood Concepts in Mechanical Ventilation

by Matthew Jurecki, BS, RRT

Mechanical ventilation competency is arguably one of the most important skillsets a respiratory therapist (RT) can possess. Competence can be defined as having suitable or sufficient skill, knowledge, and experience for the purpose of a specific task,[1] and mastery is arguably the only way a RT can be considered competent in mechanical ventilation because of its complexity. Approximately 80% of RTs work in a hospital setting[2] so one can contend that mechanical ventilation is a responsibility that most RTs will, at some point in their career, need to master to best care for their patients.

The future of mechanical ventilation in respiratory therapy

The American Association for Respiratory Care, through its "2015 and Beyond" task force, addressed how the profession of respiratory care needs to evolve to meet the clinical demands that are being placed on the practicing RT. In 2013, Robert Kacmerek cast a clear vision of respiratory care's future[3]. Of note to this article, here are some select knowledge-based assertions regarding mechanical ventilation from the "2015 and Beyond" manuscript that will become increasingly important in the future of respiratory care.

- First, RTs must be experts in mechanical ventilator technical aspects.
- Second, RTs should be capable of defining the operational differences between each mode.
- Third, RTs must be competent in waveform analysis.
- Fourth, RTs should function as mechanical ventilation consultants.[3]

An education gap exists when it comes to the basic principles of mechanical ventilation, and the following are the two most misunderstood basic concepts in mechanical ventilation.[4]

Most misunderstood concept #1: The assisted breath

It is critical for the RT to understand ventilator assistance because placing a patient on mechanical ventilation is, by definition, placing the patient on ventilatory assistance. It is logical to assume that management of ventilatory assistance is necessary for sound ventilator management.

The vision of the future set forth by the "2015 and Beyond" goals expects RTs to be experts in mechanical ventilator technical aspects,[3] but we have some room to improve because the basics of ventilatory

assistance comprise the most misunderstood concept in mechanical ventilation.[4] Part of the confusion may be caused by many clinicians learning vendor-specific ventilator terminology. On a very popular ventilator, an assisted breath is defined by the vendor as a breath in which inspiration is patient--triggered and machine--cycled; however; this definition has nothing to do with the physics of assisting patient inspiration.

The definition of an assisted breath is a breath in which the ventilator provides some or all of the work of breathing.[5] This definition of work can be explained by the equation *work = pressure x volume* where *pressure = [force/area]* and *volume = [area x distance]* (figure 1).

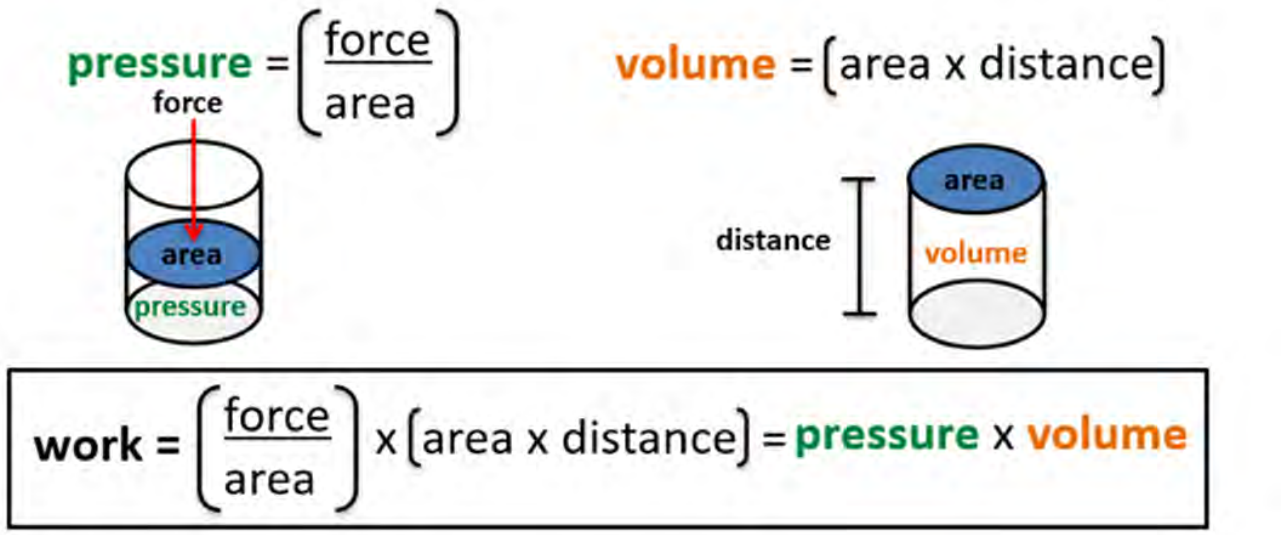

FIGURE 1: Equation for Mechanical Ventilation Work

Therefore, the change in pressure during inspiration is the work being done on the patient by the ventilator (i.e., inspiratory assistance). It may be easier to understand ventilator work by observing ventilator waveforms that can demonstrate this principle in its most basic form (figure 2).

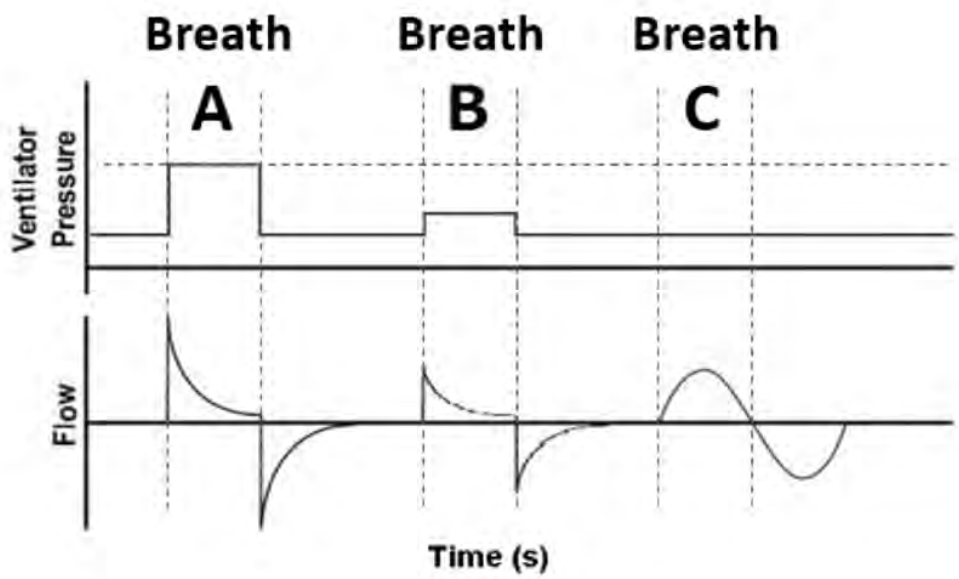

FIGURE 2: Ventilator Assistance on a Pressure-Flow Waveform

In figure 2, assume inspiratory times are the same for breath A, B, and C. In breaths A the ventilator is providing the most assistance to the patient because it has the largest change in pressure during inspiration. In breath B the ventilator is also providing assistance to the patient during inspiration because it has a change in pressure; however, it isn't as much assistance as Breath A because Breath A has a larger change in pressure during inspiration. In breath C the ventilator is providing no assistance to the patient because there is no change in ventilator pressure during inspiration; therefore, the patient is doing all the work of breathing. Thus this would not be considered an assisted breath per the previous definition of an assisted breath. Ventilator work is a very complicated concept that cannot be fully explained in a short article but understanding it in this simple way may provide some clarity on the concept.

Most misunderstood concept #2: Volume control vs. pressure control

The vision of the future set forth by the "2015 and Beyond" task force expects RTs to be capable of defining the operational differences between each mode of ventilation and to be competent in waveform analysis.[3] Many RTs, however, have difficulty defining volume control and pressure control in its most basic form and cannot consistently identify a volume control or pressure control waveform.[4]
A ventilator assists breathing using either volume control or pressure control based on the equation of motion for the respiratory system (aka, the equation of motion).[5] The equation of motion describes the math behind ventilator waveforms and is necessary to fully understand waveforms. To keep it very simple, the most basic version of the equation of motion is Pressure (ventilator) = elastance (lung) x volume + resistance (airway) x flow where elastance = (1/compliance (lung)). According to this equation, volume control means that both volume and inspiratory flow are pre-set prior to inspiration.[5] Setting the tidal volume alone is not enough for declaring a breath as volume control because some modes of pressure control allow the operator to set a target tidal volume but allow the ventilator to determine the inspiratory flow.

According to the equation of motion, pressure control means that inspiratory pressure as a function of time is predetermined.[5] Currently, this means pre-setting a pressure waveform (i.e., pressure over time is constant), or inspiratory pressure is set to be proportional to patient inspiratory effort. Elastance and resistance are products of the patient's lungs and airways respectively and for the purposes of this article will remain constant. Therefore, the only variables that can be set are both tidal volume and inspiratory

flow (pressure will vary) and the right side of the equation of motion is controlled (figure 3) or the pressure is set (i.e., tidal volume and inspiratory flow will vary) and the left side of the equation of motion is controlled (figure 4).

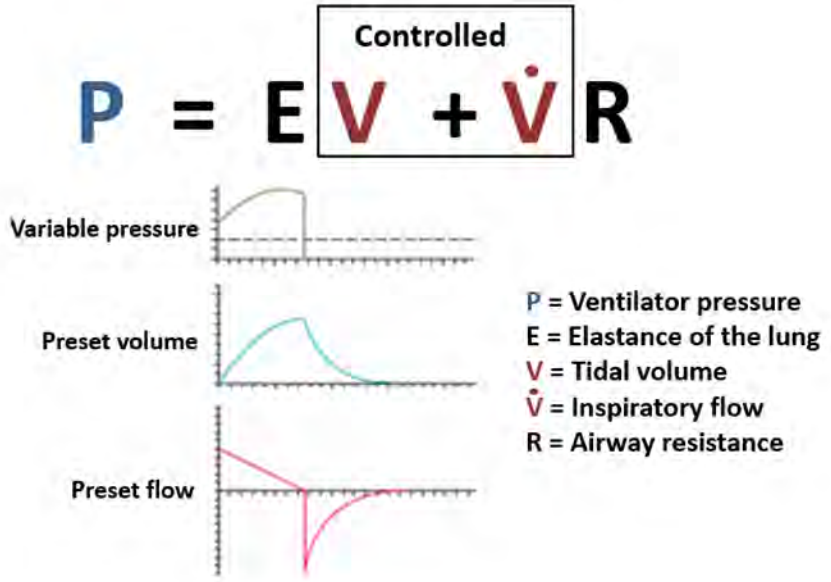

FIGURE 3: Volume Control and the Equation of Motion of the Respiratory System

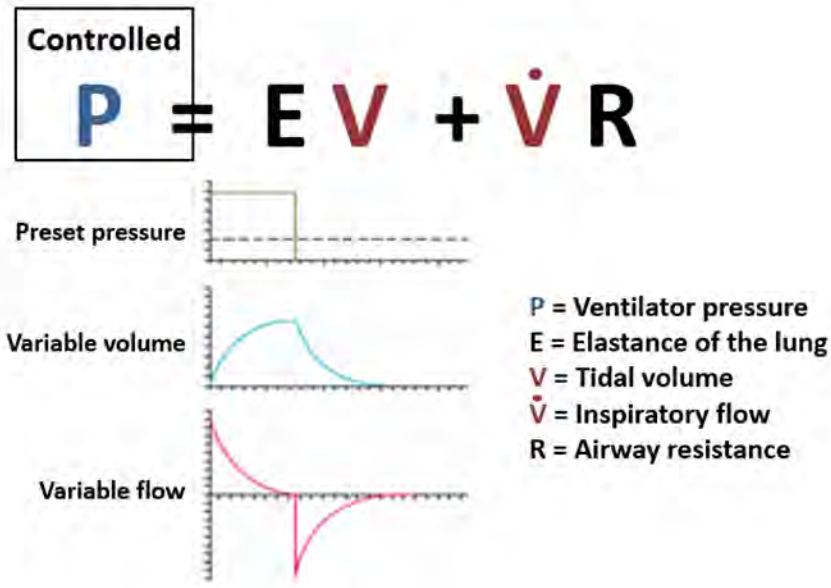

FIGURE 4: Pressure Control and the Equation of Motion of the Respiratory System

Aim for excellence RTs are called to be mechanical ventilation consultants3 and I believe we are viewed as such, but if we have misunderstanding of basic mechanical ventilation concepts the inconsistency of our explanations may discredit our good name3. A fundamental problem is that there is no broadly accepted standard approach for teaching mechanical ventilation. Part of the problem is that, until recently, nobody has tried to standardize mechanical ventilation terminology ; nor has mechanical ventilation been taught in a systematic way to build concepts leading to a thorough theoretical

understanding of ventilator design and operation. If an RT doesn't understand how a mode works, can they be taught how to use a mode?

Many textbooks have been updated recently with 10 fundamental maxims of mechanical ventilation (leading to mode taxonomy) to address this issue, but it may take years for RT programs to update their curriculua and this doesn't address the current workforce. Because I believe RTs require this knowledge to master mechanical ventilation, I recommend that RT educators standardize their teaching of mechanical ventilation by using the 10 fundamental maxims of mechanical ventilation.

Vendor names and vendor terminology confuse clinicians (e.g., Pressure Regulated Volume Control) and it is easier to teach clinicians using terminology and mechanical ventilation mode names that are standardized and have a meaning. This is not because it is important to learn two naming conventions, but because the taxonomy provides some clarity on how basic components of modes work (e.g., control variable, breath sequence, and targeting scheme).

Until RTs routinely use the basic standardized terminology, master the 10 fundamental maxims of mechanical ventilation, and understand mechanical ventilation taxonomy, it will be difficult for RTs to master advanced modes. I believe this standardization and mastery is necessary to have achieve consistency in our explanations of mechanical ventilation as a consultant to the rest of the health care team and to provide the best care for our most critically ill patients.

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Interventional Pulmonology Respiratory Therapists (IPRT): An Emerging Specialty Enriching the Practice of Advanced Bronchoscopy

By Amit K. Mahajan, MD, FCCP, DAABIP;
Kimberly Pullen, RRT, CPFT; and
Manju Parne, BS, RRT, CPFT, RYT

The advent of interventional pulmonology has revolutionized the treatment of complex airway and pleural diseases. Interventional pulmonology is a subspecialty of pulmonary medicine that is focused on the diagnosis and treatment of various thoracic diseases. Through minimally invasive bronchoscopic and pleural procedures, interventional pulmonologists are able to provide treatment for various diseases of the chest, both malignant and benign. As the specialty continues to grow, the establishment of respiratory therapists (RT) dedicated to the practice of interventional pulmonology has evolved. The growing trend of interventional pulmonology programs composed of specialized interventional pulmonary respiratory therapists (IPRTs) has taken the field to an exciting new level.

A large proportion of procedures performed by interventional pulmonologists include diagnostic and therapeutic procedures for malignant diseases of the airways, mediastinum, and pleural space. In 2018, an estimated 234,030 new cases of lung cancer were anticipated, representing about 13 percent of all cancer diagnoses.[1] The prevalence of lung cancer has created more demand for interventional pulmonology programs and has led to an increase in minimally invasive procedures such as endobronchial ultrasound (EBUS) bronchoscopy and electromagnetic navigation (EMN) bronchoscopy to diagnose both early- and late-stage cancers. Therapeutic procedures such as rigid bronchoscopy, utilizing electrosurgical devices and airway stenting, provide palliative options for advanced lung cancer involving the airways as well. In addition to malignant diseases, interventional pulmonologists also care for a number of benign thoracic diseases, such as sarcoidosis, lung transplant complications, and severe emphysema, through the use of endobronchial valves.

As the practice of interventional pulmonology has flourished, IPRTs have played a significant role in steering the evolution of this specialty. RTs harbor a unique skill set that lends to the creation successful interventional pulmonology programs. Along with a mastery of pulmonary physiology and anatomy, IPRTs have knowledge of bronchoscopy and critical illness that can be cultivated to achieve proficiency in advanced bronchoscopic procedures. Dedicated IPRTs allow for the development of procedural flow, efficiency, and the highest level of patient care. Such models in which IPRTs serve as the pillars of the interventional pulmonology program are becoming increasingly popular across the country in both community and academic medical centers.

Respiratory therapists working directly to assist interventional pulmonologists when performing advanced bronchoscopic procedures.

Our medical center, Inova Fairfax Medical Center in Falls Church, Virginia, has developed a successful interventional pulmonary program that revolves around a group of highly skilled IPRTs, perioperative nurses, and one board-certified interventional pulmonologist. The daily procedural flow is directed by the IPRT team lead and our lead clinical IPRT. Additionally, three more dedicated IPRTs assist in complex airway procedures such as rigid bronchoscopies, endobronchial ultrasound bronchoscopies, electromagnetic navigation bronchoscopies, and bronchoscopic lung volume reduction. Inova IPRTs assist both in the bronchoscopy suite and the operating room in place of procedural nurses. Furthermore, an RT serves as a dedicated lung navigator to organize advanced bronchoscopic programs, such as the incidental nodule program and the bronchoscopic lung volume reduction program. IPRTs are also involved in various industry-sponsored research projects and attend seminars at national pulmonary conventions such as courses on thoracic ultrasound. Through these efforts, along with significant administrative support, the Inova Fairfax IPRT-centered interventional pulmonary program performs six to eight advanced bronchoscopies per day, and more than 1,000 procedures yearly.

Team approach to assessing clinical situation and working together with complex bronchoscopic devices

No formalized training pathway currently exists for RTs to specialize as IPRTs. Identification of motivated, expert RTs with experience in outpatient bronchoscopy is favored. Dedication of time to only advanced bronchoscopy is essential for IPRTs to gain mastery of complex procedures and new technology. The IPRTs at Inova Fairfax Medical Center spend years of ongoing training to assist with multiple procedures per day; they work closely with device company representatives, they attend various educational procedural training opportunities, and they work closely with the cytology and pathology departments to master sample collection. Interventional pulmonology procedures can be physically and mentally taxing, often requiring hours of standing. Respiratory therapists interested in pursuing the specialization of IPRT must be cognizant of the demands of their program prior to considering a position.

A key benefit of an IPRT-based interventional pulmonology program is the ability to be economically sustainable. As a result of IPRT-driven procedural flow efficiency, high procedural volumes, and low direct costs (i.e., costs related directly to the procedure), advanced bronchoscopy procedures performed in the bronchoscopy suite at Inova Fairfax Medical Center all harbor positive contribution margins (i.e., net revenue

minus direct costs). Procedures performed in the operating room utilizing operating room nurses without specialized knowledge of bronchoscopy result in a significantly higher direct cost and typically a negative contribution margin. An example of the disparity between the contribution margins for procedures performed in the operating room versus the bronchoscopy suite can be illustrated by the rigid bronchoscopy initiative at Inova Fairfax Medical Center. Rigid bronchoscopies for stable patients were transitioned out of the operating room and into the bronchoscopy suite during this initiative. As a result, the contribution margin in the operating room for these procedures went from negative $500 to positive $3,500. No change was seen with regard to patient safety in this initiative. The change in contribution margin was directly attributed to a significantly lower facility fee and a lower direct cost for the procedure when performed in the bronchoscopy suite. Examples like this show how procedures involving IPRTs are profitable for the institution and allow the interventional pulmonology team to expand.

The growth and development of IPRTs is propelling the field of interventional pulmonology forward at a rapid pace. As recognition of the IPRT specialization grows and the role continues to evolve, the time will come for formal certification. Interventional pulmonology societies, such as the Society of Advanced Bronchoscopy (SAB) and the American Association of Bronchoscopy and Interventional Pulmonology (AABIP), have taken steps to engage IPRTs and recognize the essential role they play in the practice of interventional pulmonology. The field of interventional pulmonology will continue to progress, and the role of IPRTs will certainly continue to mature as well.

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So You Think You Want to Be a Manager?

by Amanda Richter

After working for some time as an RT, making a move into a management role may seem like the natural next step in your career progression. Before you make that leap, it is important to recognize that the skills and experience that got you to where you are today won't necessarily get you to where you need or want to be. Working as a manager in the complex ever-changing system that is today's healthcare landscape is nothing short of a challenge. If you're thinking about a future in management, here are some things to consider.

The reality is that not everyone is meant to be a manager, and that's ok. Being a manager can be extremely rewarding in a variety of ways, but it comes with just as wide a variety of challenges, too. It's important to understand what it will mean to step into that role and evaluate whether it is the right decision for you.

So, why do you want to be a manager? Is it because it's the most logical next step for you in your career? Is it because you want to be the boss and tell people what to do? Are you just looking for better pay? Maybe it's because you've been there the longest and you believe that you deserve the promotion. Do you feel that you're the best clinical therapist in the department? Or maybe you want to help make a difference in your department, to help others grow, to inspire and lead. Check your motive, find your why. If your why is focused internally (e.g., "you deserve it"), then you may want to think again about a management role. If your why is focused externally (e.g., you want to advance the department or be in a position to mentor others to grow), then you're moving in the right direction.

Being a manager is not simply a higher-level version of the job you had before. In fact, being a manager is usually a completely different job that demands an entirely new way of working and thinking. The skills you have acquired in your education and clinical experience might be enough to earn a promotion into management, but it may not be enough to help you be a successful manager because managing a team or a department requires a completely different set of skills than anything you have likely learned in your RT program or during the first few years of clinical practice. Some of these new or different skills involve budgeting; scheduling shifts; policy development, implementation, and improvement; and conflict resolution . . . not to mention an entirely different type and degree of accountability!

Management is probably going to be much harder than you ever imagined and more work than you ever expected it to be. People are complex, and teams of complex people are even more complicated. Managers are expected to focus on the business aspects of the department and to achieve results, some of which you will set for yourself and your team, and some that the institutional leadership pass down to you. Add to this the patients that your team must care for, and you get an idea of the different scale and perspective you will have to develop as a manager. Take some time to do a check-up on your business know-how and your interpersonal skills. Find opportunities to fill in the gaps in areas where your skills are weak. One great way to do this is to talk with as many managers in various areas of your institution and your field to learn about the adjustments, challenges, and rewards that come with a transition into management.

Once you become a manager, much of what happens on a daily basis is no longer about you. Moving into management means that, in many ways, you will be measured by the success of your team rather than your own successes. When you become a manager, you take on responsibility for the work of your team as well as the actions and duties of the individual members of your team — this is in addition to your own performance of team-related duties discussed previously. The work of a manager is no longer about jumping in to solve every problem, rather it is about empowering others to be successful through your efforts in coaching, setting goals, establishing and upholding best-practice procedures, etc. It can be a difficult transition to move from your contribution being dependent upon the work you do, to your contribution being dependent on how you delegate work and how others do their own work.

The demands of being a manager are many and various. You're responsible for a team, and in many cases it's a team that is working around the clock — 24/7, 365 days a year. There is often no pattern to a manager's work day. No day will ever be like the one before, with your attention switching rapidly between trivial matters and significant events. Being a manager is like being an expert firefighter, always dealing with one crisis after the next. You will have to manage changing and sometimes conflicting priorities as well as frequent interruptions. Often you will have little control over your time, and there will be days when you feel as though meetings consume your life. Also consider your approach to handling conflict at work — you will, without a doubt, have to handle conflict on a regular basis, whether that is between members of your team, between you and a member of your team, or between you and a peer manager or even managers up the leadership chain. It is important to embrace the fact that you will not be able to make everyone happy, and that is a part of the job. There will be times when you will have to deliver tough feedback or handle resistance to change.

Finally, it is not uncommon for many new managers find that training and support are lacking. This can make the transition from staff to leader more difficult than it should be. Be prepared to seek out learning opportunities on your own. Be sure to ask about training and educational support during the interview process. Seek out a mentor. Don't be afraid to ask for help.

Face it, being a manager is HARD. You must think on your feet, make decisions that affect people's lives, and deal with all sorts of interesting and unique personalities. There are times you will have to make decisions without much information or time to research and evaluate. You're human, and you're going to make mistakes. Don't be afraid to admit your mistakes — it's ok to make a wrong decision if you made it with the best intentions with the information you had available at the time . . . and if you learn from that mistake.

If you aspire to be a manager, don't let the possible challenges deter you. The rewards outweigh the challenges — after all, if they didn't, why would people remain in management? And there's so much more to these rewards than the title, the higher salary, and the authority that come with a management role. There is a great deal of satisfaction in creating the environment in which a team of respiratory care providers delivers high-quality care. The feeling of that you got when you helped a patient breathe more

comfortably is magnified many times over when you see your team doing this for many patients. Embracing the importance of coaching individuals and watching as they overcome their own challenges with your help is unlike anything else. Utilizing your own passion for providing excellent care to raise the bar for your team or department — and driving your team toward success — can be so much more rewarding than you can imagine. And you'll have the opportunity to meet and collaborate with others who share your larger-than-yourself passion for helping patients breathe better.

It is important to be aware of the challenges you may face and to have realistic expectations about being a manager. Understand that it is normal to feel that you may not be ready — most people feel this way about their first management job (remember: you probably felt that way when you started your first job!). If you are really concerned about whether you will be able to do a great job, then take the leap. The fact that you care about doing a good job is a strong indicator that you will likely do well. No amount of preparation will fully prepare you for the reality of managing people, and, as with pretty much everything, practice makes perfect.

about the author…

Amanda Richter, MHA, RRT-NPS, RRT-ACCS, RPFT, FACHE, FAARC, Respiratory Therapist of 15 years, has spent 10 years of her career serving in healthcare leadership roles.

If it wasn't for my mom…

by Doug Pursley, MEd, RRT-ACCS, FAARC

In March 1969, I was a college freshman living at home, working part-time at a local service station while going to school. It was a typical windy March day, and I had been burning trash behind the service station. Now, on a windy day, the wire mesh on top of the burn barrel doesn't stay put without a heavy rock. I must have been distracted that day, because I was let go after inadvertently setting the back lot on fire.

At dinner, my dad asked how my day went. "Not good," I replied. I had also received some bad news about my academic standing at the university in the form of mid-term grades. I could sort of see the writing on the wall.

Considering the events of the day, conversation that evening was on a downhill path when my mom brightened up the discussion with news of a job opening she'd heard about at work. "What is it?" I inquired. She proceeded to tell me about a hospital job where I'd just "haul oxygen tanks around all day." Hey, I could do that, I thought. At least I wouldn't have to put out any fires, right?

My first day on the job, the director of the department told me about an incident where a patient lit up a cigarette inside an oxygen tent and suffered third-degree burns. So much for that theory.

The job was being an Inhalation Therapist, and it entailed much more than just pushing oxygen cylinders around. Intermittent positive pressure breathing (IPPB) . . . lots and lots of IPPB. Typically with palpitation inducers such as Isuprel or Bronkosol and some type of diluent or mucolytic. The aroma of Mucomyst filled the air.

I usually went out on my rounds with three Bennett PR-2s. I'd set the first one up and get it going, go to the second patient and get it started, and finally, the third patient. By the time I got the third patient settled in, it was time to go back and take the first patient off and start the fourth patient. This was the only way to get all the treatments in, considering that almost everyone in the hospital was on IPPB and most patients were on a QID or Q4 schedule.

Our department was a Star Wars Cantina of nine therapists. Rebels. All men between the ages of 17 and 25, all of us trained on-the-job, and most of us making the minimum wage at the time of $1.32 per hour.

Yet in spite of our long hair, paisley shirts, and bell-bottomed pants, one could not find a more dedicated group of individuals. We loved our jobs and, as Dr. Tom Petty once said, it was all about the patient — and still is.

I worked at that job for a little over a year when duty called. After returning from a stint in the military, I went back to work at that same small hospital, only this time as director of the respiratory therapy department. Actually I was the director, assistant director, and staff therapist all at the same time because the hospital had recently undergone a massive reorganization and only needed one respiratory therapist. I was it, and from July 1972 to July 1973 I worked every single day — 365 days in a row. I didn't think about it, I just did it. Someone had to administer all those IPPB treatments, and that someone was me.

In 1973, two things happened that would alter my path and change my life forever. I got accepted into a newly formed respiratory therapy program in the area, and I got approval to hire a couple more therapists, which allowed me to attend school.

I graduated from that program in July 1975, and in 1976 became RRT #4211 after passing the two requisite exams — the written test and the dreaded orals.

At that time, one had to wait six months after graduation before taking the written exam and one full year before sitting for the orals. The written test was offered twice per year, and the orals were only given once per year at the AARC Congress. If you were unsuccessful at the orals, you had to wait a full year to try again.

My oral exam was in Miami on Sunday, November 7, 1976. There were two rooms (one concentrating on equipment and one on theory), and I spent twenty minutes in each room. There were two examiners and one "observer" in each room. The observer was to be a future examiner. After rapid-fire questions and 40 minutes of torture, I returned home positive that I had failed but had to wait another two months to hear my results.

On a cold January day in 1977, I found out. I was at work on a Saturday when my wife called and said that I had received a letter from the NBRC. My exam results. She asked if I wanted her to open the letter. I remember saying, "Is it a thin envelope or a thick envelope?" "Thin," she said. At that moment I sighed in relief because, in those days, the thin envelope simply had a white card that was marked "pass." The thick envelope contained the same card marked "fail" and a multi-page reapplication form. Somehow, I had survived the orals.

The first part of my career was spent learning from excellent mentors like Bob Kiker and Larry Zwagil. The last part was spent primarily educating future respiratory therapists — 30 classes and 400 plus graduates in all. There were a few challenging years, but I always looked forward to going to work because I loved what I was doing and felt like I was making a difference. I retired from being a full-time educator in 2015.

These days I stay involved as an adjunct professor at Ozarks Technical Community College in Springfield, Missouri. Education has always been my passion, and I still enjoy conducting critical thinking sessions and helping out with research projects because it is my firm belief that these type of activities help produce better bedside clinicians.

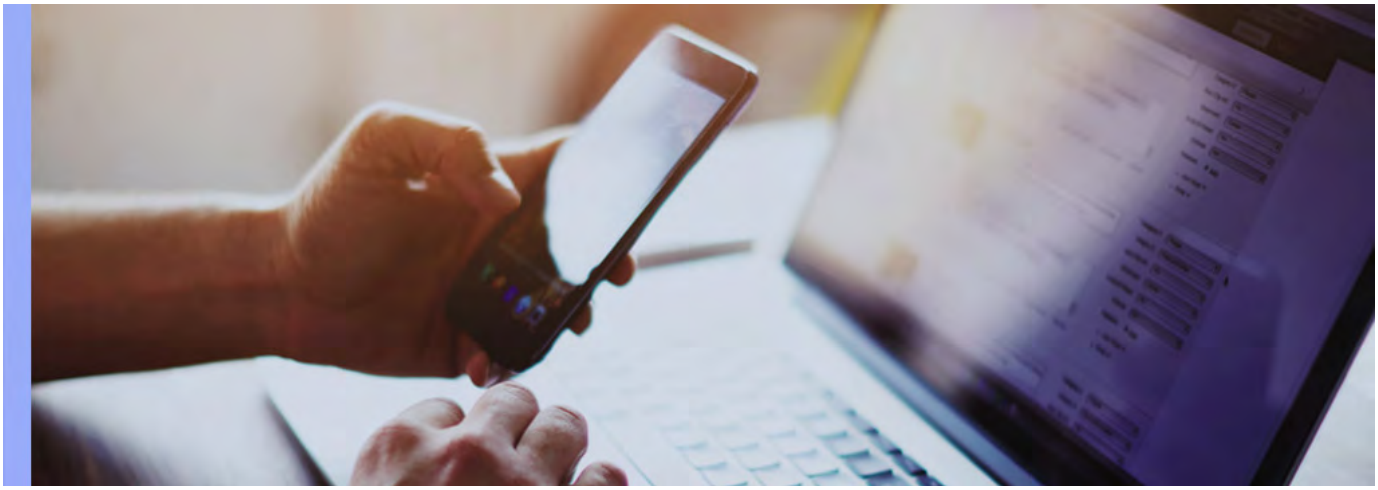
Someone once said that a good teacher can inspire hope, ignite the imagination, and instill a love of learning. Very true. I would add that a good teacher's impact is exponential. That is, concepts and skills

that an educator imparts to one graduate can end up affecting thousands of patients throughout the graduate's career. Food for thought.

The field of respiratory care has been good to me, but if it wasn't for my mom, I would not have had this grand 50-year experience.

NBRC 2020 Changes: What To Expect

by Cari Turner



As the new year begins, the NBRC would like to remind you of several changes and improvements you can expect in 2020.

Virtual Calculator — An on-screen, virtual calculator will become available for NBRC examinations starting in January. Learn more here.

Repeat Attempt Policy — After two attempts (PFT, NPS, SDS, ACCS) or three attempts (TMC or CSE), a waiting period will be imposed before a candidate may again attempt the examination(s). Learn more here.

Score Reporting — Subscores are being removed from candidate score reports; only total scores will be reported. Learn more here.

New Exam Content — Updated content for the Therapist Multiple-Choice Examination (TMC) and the Clinical Simulation Examination (CSE) will start on January 15, 2020. Learn more here.

Credential Maintenance Program (CMP) — Beginning January 1, 2020, all practitioners holding credentials with an expiration date will participate in the CMP, regardless of their certification cycle. Learn more here.

For more information on these or other topics, visit nbrc.org or contact NBRC's Customer Care Specialist Team at 913.895.4900 or nbrc-info@nbrc.org.

A Couple of Take Homes from the 2019 AARC Congress

by Thomas Kallstrom, MBA, RRT, FAARC

Keynote

If you were at the 2019 AARC Congress and heard the Keynote address by Ted Koppel, you might have picked up how much being a patient advocate for the population of COPD patients in the United States means to him and his wife, Grace Anne. And why not? His life-long partner and wife has COPD, and together they have experienced what many of our COPD patients have gone through or are now going through.

Sadly, when Grace Anne Dorney Koppel's COPD was first diagnosed, her physician told the Koppels that she had just a few years to live. He essentially gave her a death notice. She was told to get her affairs in order or to basically give up.

Pulmonary rehab was her saving grace

Now, after almost 20 years, Dorney Koppel credits pulmonary rehab and the indispensable role of the respiratory therapist for her ability to have an active and fulfilling life today.

The Koppels not only fight the good fight, but they also walk the talk. What do I mean by this? The Koppels have co-founded 12 pulmonary rehabilitation centers with a primary focus on rural communities around the United States. As respiratory therapists, we know that this can make a huge difference for patients and their caregivers. And they haven't stopped there.

The Koppels are adamant that there be significant increases in research funding through the National Institutes of Health (NIH). According to Koppel, COPD is 165th on the list of clinical research priorities. This is crazy when you consider that COPD is the third-leading cause of chronic disease deaths in the United States. Unfortunately, COPD research pales in comparison to that for other diseases that also have significant morbidity and mortality.

While we can play the blame game on our patients because many who are afflicted today with COPD smoked tobacco products knowing the risks associated with this behavior. This should not negate the need for us to find better early diagnostic and treatment options. As Koppel said, by comparison cardiac

rehab is better funded from the Centers for Medicare and Medicaid Services, and research monies from NIH are much higher. He lamented that behavior should not be a deciding factor, citing the example of the patient who frequents fast food restaurants three times a week and later has a cardiac condition. Where is the shame and blame for those patients?

During his keynote, Koppel presented a powerful video that shows the anger in patients who are not getting the attention that they need. It is worth watching (https://www.youtube.com/watch?v=1Hbx6Gr0psQ).

One thing that Koppel noted in his message was that both he and his wife hold respiratory therapists in very high esteem. In fact, it was with the significant presence of RTs in their COPD pulmonary rehab journey that helped Dorney Koppel get better.

Koppel challenged attendees to think outside the box. Why not offer pulmonary rehab clinics at a national retailer like Walmart? As Koppel noted, there is hardly a week that goes by when the typical customer does not visit these stores.

Finally, he urged respiratory therapists to be more vocal with their needs to make sure patients with COPD are heard. He mentioned that unless larger numbers of Americans contact their elected representatives with a collective voice, we and our patients will be ignored.

Changes in Attendees

We are in a time of change. As a very large segment of Baby Boomers retires, we see renewed growth in our newer members.

This is exciting to see.

Immediately before the Congress, we had three days of AARC Board and House of Delegates meetings. The House and Board have continued to bring students into these meetings so that they can see how the organization operates. I'm sure many students and even practicing therapists do not understand or appreciate how we operate at a micro-level. By all accounts, this has been very successful, and my recommendation is to expand this program to new graduates as well.

As an old Congress attendee as well as an active part of the Congress, I was left this year with the definite impression that the demographics of attendees are changing. We seem to be drawing in a more international crowd, which does not surprise me, given our expansion outside the United States. And maybe it is because I am getting older, but it seems that there is an influx of younger attendees, many of whom are first-time attendees.

This is really great to see and makes me proud as we see the continued growth of the profession reflected in our annual meetings.

about the author…

Thomas J. Kallstrom, MBA, RRT, FAARC, is executive vice president of the ARCF and executive director of the AARC.

The Silent Killer

by Anthony L. DeWitt, JD, RRT, FAARC

Her name is Aniah Blanchard, and as of the writing of this column, she is missing and presumed to have met with foul play. This bright, vivacious, young woman, returning to her home following a funeral, was abducted by two men after leaving a convenience store. For days, no one knew what happened to her after she left that store. They just knew she was missing.

Then a witness — as yet unidentified — came forward to say that he saw the young woman being forced into a car by a man he had seen in the convenience store. When asked why he didn't come forward sooner, he said, "I was told by my girlfriend that I should mind my own business."

With the evidence now indicating that the young woman was harmed within an hour of her abduction, the witness's failure to take immediate action by calling the police is a regret he will carry for the rest of his life.

It is tempting to think that minding one's own business is a good idea in every situation. In the supermarket, where two people are arguing over the last of the kiwi fruit, it probably is. In the hospital, where someone's life may depend on malfeasance and error being reported, it rarely is.

Everyone who is human makes errors. It's the reason they put erasers at the end of pencils. No one likes to report their own mistake. No one really likes to report the error of another clinician, except, perhaps, to that clinician. We trust them to take care of it. But sometimes that trust is misplaced. Sometimes they do nothing. And sometimes the results are devastating.

Her name was Danielle, and she was a bright and vivacious two year old with a very bad case of tonsillitis. After a treatment regimen of antibiotics failed, surgery was scheduled at a small hospital in Oklahoma. The hospital had no surgeon. It brought in a surgeon from one of the larger cities, who flew in. After he did the surgery, he left, turning her care over to the family physician. Everyone involved had seen this play out time and again with no trouble. Until this time.

The surgeon preferred dextrose 5% in 25% normal saline as his intravenous (IV) lifeline, and the CRNA set it to run KVO (i.e., "keep vein open"). The surgery went well, and the child was transferred to the pediatric unit where her care was given over to an LPN. The LPN was not certified to manage IV lines.

Similarly, there was no volume-limiting device or pump attached to the IV. Worse, apparently the LPN had not paid much attention when fluids and electrolytes were discussed in her LPN program, because she allowed an entire liter of IV solution to run into this 25-pound child, and the only annotation in the record was her note: “new bag hung” written about 25 minutes after the child returned from surgery. Throughout the day the child, who had initially started to wake up after surgery, instead became increasingly somnolent. She started having emesis frequently. When the nurses were asked about this, they told the mother that it was “normal” after surgery. Anyone who has worked with post-op patients know that post-op emesis is somewhat normal. But focusing on the surgery was error.

Because no one but the LPN knew that the IV solution had run in, no one thought to do electrolytes. Then a second error occurred. An RN, unaware of the fluid issue, gave an adult dose of the antiemetic Tigan. She notified the doctor, and he sought guidance from poison control. Poison control told them to “watch for extrapyramidal symptoms.” When the child suffered from seizures due to increasing intracranial pressure, they attributed it to the anti-emetic. The child later died from brainstem herniation due to hyponatremia.

The real price of inaction when it comes to medical error is that human life is often lost or damaged so badly that it requires custodial care for decades. The frustrating part about this is that it is completely preventable in many cases. Imagine that the LPN had come forward and admitted her error. Certainly, her supervisor would have been upset, perhaps even angry. It’s even possible that the nurse would have lost her job as a result. But the child would have lived. She would have had the chance to grow up to be a happy, healthy woman with a bright future. The LPN’s failure to own up to that mistake took everything from that child. All it would have taken to prevent it was confessing to her supervisor that she had made an error.

It is also possible that someone working with the nurse knew, in real time, of the error. If so, they likely didn’t report it because they were afraid. They were afraid they’d be ostracized by their peers. They were afraid that the nurse might not like them anymore. If this was indeed the case, then their fear cost an innocent young life.

The most cunning silent killer in any community is the health care worker who looks the other way when lives are on the line. Medical errors happen. People are rarely fired for them. They happen because people are human. But, if caught in time, the result can be a life saved. On the reverse of that coin, regrets last a lifetime.

Don’t look the other way. Do not “mind your own business” if you see a potentially life-altering medical error. Act as if the patient involved were your own family member. Be a patient advocate. If your co-worker doesn’t understand, that’s their problem to deal with. You’ll be able to look in the mirror knowing that, when it counted, you did the right thing.

about the author…

Anthony L. DeWitt, JD, RRT, FAARC, is an attorney and a partner in the firm Bartimus, Frickleton, 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

RC Currents

IN THE NEWS

The Evidence Mounts

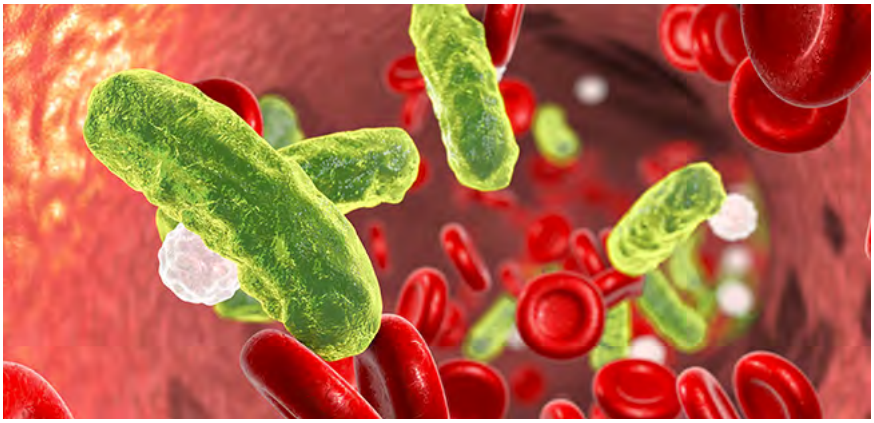
Studies continue to question the health effects of e-cigarettes on the lungs. Now researchers from the Smidt Heart Institute at Cedars-Sinai suggest these devices harm the heart as well — perhaps even more than traditional cigarettes.

In a study presented at the recent American Heart Association conference, the researchers measured blood flow to the heart muscle in healthy smokers aged 18–38 years before and after sessions of e-cigarette use or cigarette smoking. Subjects were also tested while at rest and after they performed a handgrip exercise simulating physiologic stress.

In smokers who used traditional cigarettes, blood flow increased modestly after traditional cigarette inhalation and then decreased with subsequent stress. However, in smokers who used e-cigarettes, blood flow decreased after both inhalation at rest and after handgrip stress.

“Our results suggest that e-cigarette use is associated with coronary vascular dysfunction at rest, even in the absence of physiologic stress,” said study author Susan Cheng, MD, MPH, MMsc. “These findings indicate the opposite of what e-cigarette and vaping marketing is saying about their safety profile.”

New Hope for Sepsis



Every RT who has worked in the ICU for any length of time has seen the devastating effects of sepsis. Researchers from Cincinnati Children's Hospital Medical Center have now developed and successfully tested a new rapid blood assay that measures five biomarkers that can be used to accurately predict which patients are at low, medium, or high risk for death from sepsis. The test could be a game changer because it would allow patients to be treated before the condition gets out of hand.

The test is called PERSEVERE and allows clinicians to detect and stratify sepsis at its earliest moments, just as the body is about to unleash a storm of bacterial infection. The assay platform also gives researchers important clues about how the sepsis got started, how it ramped out of control, and how it can be stopped with new therapeutic approaches. By knowing which five proteins and genes make up the assay's five-biomarker blood panel, physicians should be able to start medical interventions much earlier and with greater precision, report the authors. PERSEVERE is currently in development for children, and an adult version is on the way, too.

The report appeared in a recent edition of Science Translational Medicine.

Report Card on Preterm Birth

RTs play a key role in the neonatal ICU, helping preterm infants fight for their lives. The March of Dimes recently tallied the costs associated with these births, emphasizing the need for states to take action to ensure social determinates of health do not impact the health and well-being of these babies and their mothers. According to their report card —

- The rate of preterm birth increased from 9.63% in 2015 to 10.02% in 2018.

- The total cost in 2016, including medical costs for children, medical costs of maternal delivery, early intervention, special education services, and lost labor market productivity, totaled $25.2 billion, or an average of $64,815 per preterm birth.
- From 2005 to 2016, the average cost of a preterm birth increased by 25%.
- Each year, more than 22,000 babies die in the United States before their first birthday — that's two babies every hour.

The report card was compiled by researchers from the University of Utah.

Sleep Problems Common in Kids with Chronic Kidney Disease

Sleep problems may be taking a toll on kids with kidney disease, report researchers from Children's Mercy Kansas City who presented at the recent ASN Kidney Week conference. The team examined clinical trial data related to fatigue, sleep disturbance, low energy, and trouble sleeping in 1,030 children with mild-to-moderate chronic kidney disease. Results showed that 26% experienced fatigue, 30% reported sleep disturbances, 39% experienced trouble sleeping, and 52% had low energy. Sleep disturbance, trouble sleeping, and low energy were significantly associated with worse parent ratings of cognitive processes responsible for control of behavior, and fatigue and sleep problems were also associated with more parent-reported emotional and behavioral symptoms.

Mmm, Mmm, Bad?

The presence of flavors other than mint or menthol may be fooling many people — especially kids — into believing that e-cigarettes are not harmful to their health. That's the take-home message from University of North Carolina-Chapel Hill researchers who reviewed previous studies on the topic. They found —

- Five studies indicating that non-menthol flavors in e-cigarettes decrease the perception that e-cigarettes are harmful, particularly fruit and candy flavors.
- Six studies indicating that flavors increase the willingness of youth and young adults to try or initiate the use of e-cigarettes.
- Seven studies showing that flavors increase product appeal among adults.
- Five studies revealing that flavors are a primary reason adults use e-cigarettes.
- Six studies showing that the role of flavored e-cigarettes on smoking cessation among adults is unclear; one study among youth showed that youth who use flavored e-cigarettes were less likely to quit tobacco.

"Our synthesis of evidence regarding the role of non-menthol flavors in e-cigarettes on product perceptions and use is particularly relevant to the FDA's recently proposed policy framework that seeks to place additional regulations on the sale of non-menthol-flavored e-cigarettes to youth," said study author Hannah Baker, MPH.

The study appeared in a recent edition of *BMJ Open*.

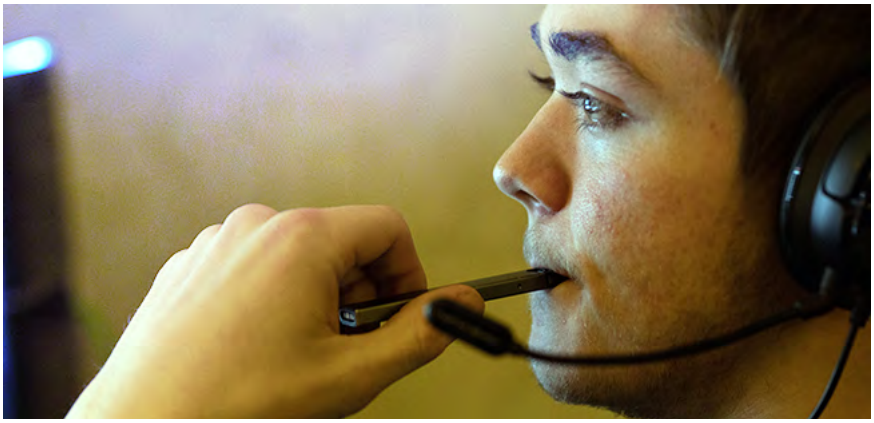
Classroom Air

Are schoolchildren breathing the healthiest air possible? Maybe not, say researchers from UC Davis and the Department of Energy's Lawrence Berkeley National Laboratory. When they visited 104 classrooms in 11 schools throughout California that had been retrofitted with new heating, ventilation, and air conditioning (HVAC) units in the past three years, they found 85% did not provide adequate ventilation. The investigators measured CO2 concentrations and the number of people in each classroom to arrive at their findings. In addition to the ventilation issues identified by the study, they also noted that the classrooms were warmer than recommended and that about 30% of teachers believed that the temperature in their classrooms interfered with learning.

The good news is that the researchers found simple solutions that could help. In field tests conducted at two additional California schools, the team tested ventilation system filters at two different efficiency rating (MERV) levels: MERV 8 and MERV 13. They found that using MERV 13 filters leads to a substantial decrease in PM2.5, the fine particulate matter that poses serious health risks.

"This is important because as you ventilate and bring in outside air, you will also bring in outdoor air pollutants into classrooms," said study author Rengie Chan. Still the investigators stress that increased oversight of HVAC replacements and other ways to address widespread inadequate ventilation in California classrooms are needed.

Mint Wins with Kids

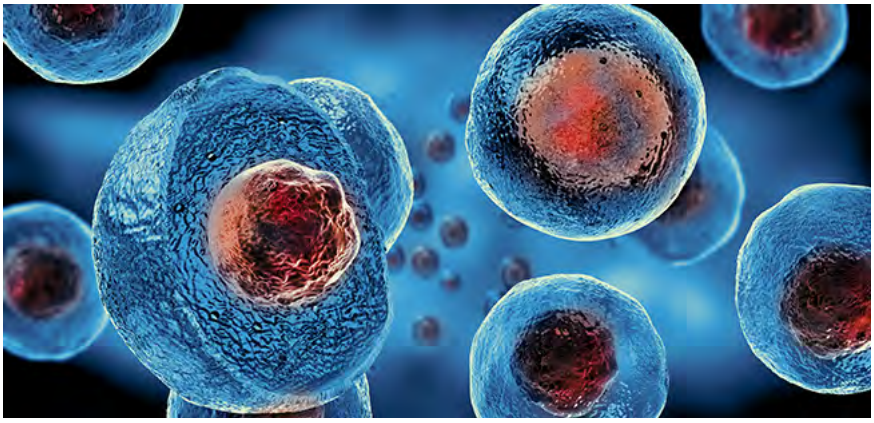


JUUL voluntarily pulled its e-cigarette products with some flavors appealing to children from the market, but the company did not touch its mint-flavored products. That is a problem, say researchers from the University of Southern California, who polled teens about their favorite e-cig flavors. Mint won hands down, with 44% of high school sophomores and 47% of high school seniors choosing it as their favorite flavor. Mango was a distant second in those grades, at 27% and 24%, respectively. Mint came in second after mango among eighth graders, but when the researchers looked only at teens who used JUUL on 20 or more days in the past month, mint was the most popular flavor in all grades.

“Regulations which reduce youth exposure to flavored e-cigarettes may aid in preventing young people who try e-cigarettes from becoming long-term e-cig users,” said study author Adam Leventhal. “Regulations like these could also encourage the millions of U.S. adolescents who already use e-cigarettes to quit vaping, especially if they can no longer access e-cigs in flavors they like, which, according to our study, include both minty and fruity flavors.”

The study was published in a recent edition of JAMA.

How Stem Cells May Impact BPD



Could stem cells hold the key to which infants develop bronchopulmonary dysplasia (BPD) and which do not? A new study out of Ann & Robert H. Lurie Children’s Hospital of Chicago offers some tantalizing clues. The investigators looked at stem cell differences in cord blood and tissue from 200 preemies of different gestational ages, measuring both the percentage of hematopoietic stem cells (ie, those circulating in blood) and mesenchymal stem cells (ie, those derived from umbilical cord tissue). They also evaluated biochemical factors in cord blood plasma. Results indicated that infants who developed BPD had more stem cells at birth. They also had decreased levels of a growth factor called G-CSF, which is responsible for stem cell migration and differentiation.

The authors suggest that stems cells in these infants may not be functioning properly or may not be mobilized effectively to differentiate into healthy blood or tissue cells. They believe more research is warranted to determine why premature infants who later are diagnosed with BPD are born with more hematopoietic and mesenchymal stem cells.

The study was published in a recent edition of *Frontiers in Pediatrics*.

Government Survey Gauges E-Cigarette Use in Teens

A new study from researchers at the FDA and CDC shows an alarming number of children are using e-cigarettes. The findings come from a cross-sectional survey of 19,018 kids that was conducted in 2019. Key results include —

- An estimated 27.5% of high school students and 10.5% of middle school students reported current e-cigarette use; of those users, an estimated 34% of high school students and 18% of middle school students reported frequent use.
- Overall, an estimated 4.1 million high school students and 1.2 million middle school students were using e-cigarettes.
- JUUL was reported by 59.1% of high school students and 54.1% of middle school students as their usual brand of e-cigarette in the past 30 days.
- Among current e-cigarette users who didn't use other tobacco products, an estimated 72% of high school students and 59% of middle school students used flavored e-cigarettes, with fruit, menthol or mint, and candy, desserts, or other sweets being the most commonly reported flavors.

The study was published late last year in JAMA.

CF Drug Combo Proves Effective

Researchers publishing in *The New England Journal of Medicine* have found that a three-drug combination improves lung function and reduces symptoms in patients with cystic fibrosis (CF) who have a single copy of the most common genetic mutation for the disease, the Phe508del CFTR mutation. The study, which was conducted at 115 sites in 13 countries, involved 403 patients age 12 and older who were randomized to receive either the elexacaftor-tezacaftor-ivacaftor combined therapy or a placebo. Lung function was measured at four weeks and at 24 weeks. Compared with patients receiving a placebo, lung function in the treatment group was significantly improved at four weeks and sustained through week 24. What's more, lung flare-ups were 63% lower in the treatment group, and patients assigned the drug combination reported better quality of life and respiratory symptoms on a questionnaire. The FDA approved the drug combination based on the results of this international study in October of last year.

Family History of Cancer May Raise Asthma Risk

A family history of cancer may raise the risk for asthma in children, report researchers who used data from the National Health Interview Survey (NHIS) to study the link between the two conditions. Results showed that more than 20% of the 57,000 children in the analysis who had a family history of cancer also had an asthma diagnosis.

"The NHIS survey reflects the U.S. population, and because of the large number of those surveyed, the findings are significant for people across the country," said study author Rauno Joks. "If a parent knows there is a family history of cancer, they should be sure to tell their pediatrician and allergist, as an extra effort at asthma screening could be valuable in diagnosing and treating childhood asthma."

The study was presented at the 2019 American College of Allergy, Asthma and Immunology Annual Scientific Conference.

Inhaled Immunosuppression Improves Outcomes for Lung Transplant Patients

Lung transplant recipients who had early signs of organ rejection increased their chances of survival by using an inhaled form of the immunosuppression drug cyclosporine in a study published in *ERJ Open Research* late last year. Investigators from the University of Maryland School of Medicine followed 21 lung transplant patients in the early stages of bronchiolitis obliterans syndrome — a condition that affects nearly half of all lung transplant recipients within five years of the transplant — for 48 months. All received conventional oral immunosuppressants, and 11 were randomly selected to also receive the inhaled cyclosporine twice daily for 24 weeks.

Improved lung function was seen in patients who received the inhaled liposomal cyclosporine without any additional toxicities, such as cough, shortness of breath, and pharyngeal soreness. At 48 weeks posttransplant, progression-free survival was 82% for the treatment group versus 50% for the standard-of-care group. Bronchiolitis obliterans syndrome grade significantly worsened for only 18% in the treatment group versus 60% in the control group. FEV and FVC stabilized in the treatment group but worsened in the control group. Most importantly, the median survival for those who received the inhaled cyclosporine was 4.1 years compared to 2.9 years for those who did not receive the added therapy.

“We can get higher concentrations of the drug to the lungs through inhalation, compared to what we might get just by giving it by mouth,” said study author Bartley P. Griffith, MD. “We are very pleased that we may be able to see this long-term idea realized in many more patients. We are offering both lung transplantation and hope.”

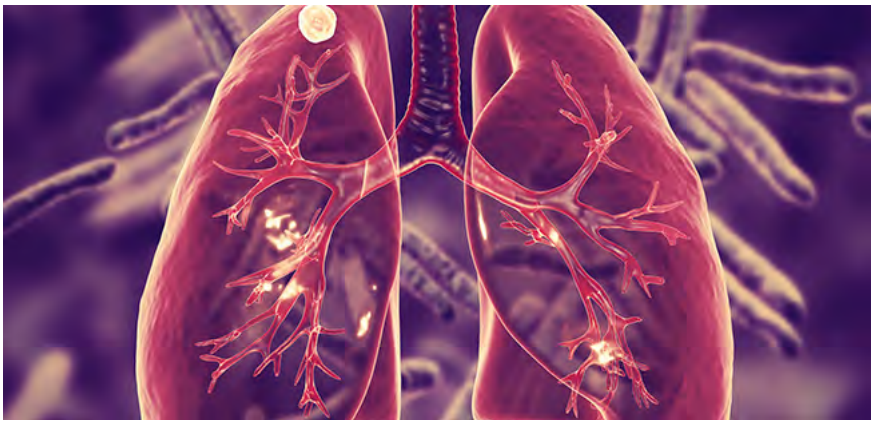
Telemedicine? Yes, Please, Say Parents

Parents of children with allergies and asthma gave telemedicine appointments high marks in a study conducted among 299 pediatric patients and their families. Researchers presenting at the recent American College of Allergy, Asthma and Immunology Annual Scientific Meeting reported that 37% were

more satisfied with the telemedicine visits than with traditional visits, and 63% were equally satisfied. None of the parents reported being unsatisfied with telemedicine.

What did the parents most like about the telemedicine approach? Seventy-six percent said convenience was a key factor. They specifically liked not having to get their kids out for an office visit.

Infection With TB Not Always a Life Sentence



Health officials have long believed that tuberculous infection is lifelong and can, at any time, cause tuberculosis (TB). Not necessarily, report University of Pennsylvania investigators who analyzed data from previous studies —

- A paper in *Bibliotheca Tuberculosea* reported that treatment of people with TB immunoreactivity for one year lowered the incidence of active TB by 60–70% over the next nine years, and those who were treated remained skin test–positive for TB up to nine years later, showing that TB immunoreactivity can outlast elimination of infection by at least nine years.
- An *American Journal of Respiratory Critical Care Medicine* study of patients co-infected with HIV and TB reported that 89–97.5% of those with positive TB immunoreactivity tests remained free of TB from their remote infection over a five-year period.
- A study of stem cell transplant patients, published in the journal *Clinical Infectious Disease*, reported that none of the 29 participants from the U.S. cohort with TB immunoreactivity developed TB after a total of 89 person-years of observation.

“TB immunoreactivity is not a marker for the presence of continued TB infection,” wrote the authors. “Rather, it serves as a sign of having been infected with TB at some point.”

The review appeared in a recent edition of BMJ.

Wearable PO2 Monitor in Development for Infants

Engineers at the Worcester Polytechnic Institute are developing a Band-Aid-sized oxygen monitor that they believe will be able to replace transcutaneous monitoring of PO2 levels in infants. The device will use wireless power transfer and will be wirelessly connected to the internet so that an alarm on a monitor in a doctor's office or smartphone app can notify medical personnel and family members if the baby's oxygen level begins to drop. The researchers hope that their new monitor will allow more infants to return home earlier and be with their families while still receiving the ongoing PO2 monitoring they need. They plan to adapt the device so it can be used in adults with conditions like asthma and COPD as well.

Inhalable Treatment for Lung Cancer in the Works

An inhalable nanoparticle immunotherapy system under development at Wake Forest School of Medicine may one day offer new hope to patients with metastatic lung tumors. The system has been tested in a mouse model of metastatic lung cancer, with results showing that when deposited in the lung air sacs, the immunostimulant-loaded nanoparticles were taken up by one specific type of immune cells, called antigen-presenting cells (APC). The immunostimulant was then released inside the cell, where stimulation of a particular immune pathway activated the APC cell, which is a critical step to induce systemic immune response.

The team also reported that combining the nanoparticle inhalation with radiation applied to a portion of one lung led to regression of tumors in both lungs and prolonged survival of the mice. This treatment completely eliminated lung tumors in some of the mice. Through mechanistic studies, the team then confirmed that the inhalation system converted those initially cold tumors in both lungs to hot tumors favorable for robust anti-cancer immunity.

"The goal of our research was to develop a novel means to convert cold tumors to hot, immune-responsive tumors," said study author Dawen Zhao, MD, PhD. "We wanted it to be noninvasive without

needle injection, able to access multiple lung tumors at a time, and be safe for repeated use. We were hoping that this new approach would boost the body's immune system to more effectively fight lung cancer."

The study was published in a recent edition of *Nature Communications*.

Finnish Research Refutes Previous Findings on Smoking and Stroke

Studies have suggested that smokers and those with hypertension may be protected from a severe type of stroke called subarachnoid hemorrhage. Not so, report Finnish researchers publishing in a recent edition of Neurology. They believe that the previous findings were erroneous because the research was based only on people who survived the stroke until they could reach a hospital. Most people with this type of stroke die before reaching a hospital, but most countries do not require an autopsy for deaths that occur outside of a hospital. That is not the case in Finland, so these researchers were able to include those deaths in their study.

When they were included, results indicated that smokers and hypertensive individuals were more likely to die before they reached hospital wards than non-smokers and those with normal blood pressure.

"Due to the mandatory autopsies for all sudden deaths in Finland, we were able to identify and include data on those individuals who died before reaching hospital wards. This in turn allowed us to show how results change when all people with subarachnoid hemorrhage, not only those surviving to hospitals, are included in the analyses." said physician Joni Lindbohm, MD, PhD, the principal author of the research article.

Strange but True . . .

Who needs oxygen? Hypoxia is not a good thing for people, but it seems to work wonders for cancer cells. Johns Hopkins researchers have found that breast cancer cells have a four times greater probability of becoming viable circulating tumor cells under low oxygen levels than under normal oxygen conditions. These posthypoxic cells have six times the probability of forming lung metastases. The investigators hope that hypoxic cells can be used as biomarkers to identify patients at risk for metastasis or even be directly targeted by therapies to prevent metastasis from happening.

21st-century sleep loss: Streaming services are changing the way we watch TV. According to the latest survey from the American Academy of Sleep Medicine, they're also changing the way we sleep — and not for the better. Fully 88% of Americans in the poll admitted to losing sleep due to staying up late to watch multiple episodes of a streaming series on TV. That figure jumped to 95% among those age 18 to 44.

Potted plants aren't the air-pollution fighters you think they are: Plants can help clean the indoor air, right? Nope, say investigators from Drexel University. They applied a new measure called the "clean air delivery rate" to data collected in previous studies that did find an air cleaning effect for plants. Results showed that the rate at which plants dissipated VOCs in a chamber was orders of magnitude slower than the standard rate of air exchange in a building, thus proving the plants' overall effect on indoor air quality to be irrelevant.

Contribute to the AARC "Transitions" Column

The AARC "Transitions" column is devoted to sharing news about the passing of AARC members. Use our online form to send news about your colleagues' recent passing. Please provide any information about the member's recent death, such as an obituary, so that we can share it with our members and pay tribute.

Tell Your Story

Every therapist has a story to tell about a favorite or most memorable patient that would interest others in the profession. Maybe it was an "aha moment" when you knew you had made the right professional decision for that patient. Maybe it was when you first realized how much difference you were making in the lives of that patient and his family. Or maybe it was just something the patient said or did that made you laugh or cry or just be inspired to be a better RT. Our "Storytellers" column is the place to share them.

Send your story to heather.willden@aarc.org.

Industry Watch

Companies team up to add FeNO measurement to PFT system

PulmOne USA, Inc., has entered into a partnership agreement with Circassia Pharmaceuticals to offer the NIOX VERO fractional exhaled nitric oxide (FeNO) airway inflammation measurement system as an integrated add-on to PulmOne's MiniBox+. The new integrated system will be offered to both companies' current users as well as to new customers. The MiniBox+, a desktop, cabinless device, is used by specialists and primary care physicians for complete pulmonary function testing, including lung volume measurements, spirometry, and diffusing capacity. Integrating the NIOX VERO asthma management system into the MiniBox+ expands the testing capabilities of the device, enabling physicians to detect and treat an even wider range of respiratory disorders.

Partnership aims to streamline delivery of flu medication

Genentech, the maker of Xofluza, a new prescription medicine used to treat the flu, has partnered with the virtual health platform, PlushCare. PlushCare allows patients to book a same-day virtual appointment, speak with a qualified doctor, and, after diagnosis, have a prescribed flu medication sent to the pharmacy of their choice.

"We are so excited to partner with Genentech to raise awareness surrounding the severity of influenza and the importance of early detection and treatment," said PlushCare co-founder and CEO Ryan McQuaid.

Employer-based sleep apnea program reduces health insurance claims

A joint study conducted by Precision Pulmonary Diagnostics, Harvard Medical School, the Virginia Tech Transportation Institute, and the University of Minnesota-Morris has reported that employer-sponsored sleep apnea screening, diagnosis, and treatment yields significant savings in employee health insurance claim costs. The study analyzed more than 1,200 commercial truck drivers diagnosed with sleep apnea through their employer's sponsored program and compared their non-sleep apnea–related health claims over a four-year period. Drivers with sleep apnea who accepted treatment with CPAP saved on average

$441 in non-sleep apnea health costs per month when compared to drivers who were not treated. The study was published in a recent edition of SLEEP.

IAH demonstration saves Medicare dollars

According to the American Academy of Home Care Medicine, the Independence at Home (IAH) Demonstration Year 5 practice expenditures were $33.5 million below Medicare spending targets. IAH tests whether accessible primary care for high-need patients can improve patient and family experiences while reducing total costs and hospital admissions. Over the five years of the demonstration, the home-based primary care practices have generated about $100 million in savings while delivering high-quality care to Medicare patients, highlighting the value of a home-based primary care model with an emphasis on a high-touch and high-tech mobile team to serve complex, frail elders.

NLCRT updates resource center

The National Lung Cancer Roundtable (NLCRT) has expanded its portal of resources to help Americans fight lung cancer. The updated Resource Center includes new videos, infographics, research, and more. The NLCRT is a collaboration between public, private, and voluntary organizations that play a key role in reducing the incidence of and mortality from lung cancer. The NLCRT Resource Center curates member organizations' educational and support materials on lung cancer statistics, risk factors, screening, symptoms, public and provider education, and comprehensive biomarker testing and treatment modalities, all designed to make it easier for patients, their families, and health care providers to find the information they need.

Grifols offers free alpha-1 screening test

Grifols, a global producer of plasma-derived medicines and innovative diagnostic solutions, has introduced AlphaID, a new, simple cheek swab that can be used by physicians to screen patients with COPD for alpha-1 antitrypsin deficiency (Alpha-1). AlphaID uses an FDA-approved genotyping assay to screen for the 14 most prevalently reported genetic mutations associated with Alpha-1, including the S, Z, F, and I alleles, as well as rare and null alleles. Personal, comprehensive results are available within a week, and both the test and the analysis are free to providers and patients.

Cancer network throws support behind lung cancer study

The National Comprehensive Cancer Network Oncology Research Program is supporting a phase-2 randomized trial for lung cancer patients. Genentech is providing funding and drugs for the study, and the investigation is being carried out by researchers from Fox Chase Cancer Center and the Robert H. Lurie Comprehensive Cancer Center of Northwestern University. The trial will focus on patients whose tumors include an EGFR mutation or who are never smokers (defined as fewer than 100 cigarettes in their lifetime) and will examine whether the anti-PD-L1 inhibitor atezolizumab plus carboplatin, pemetrexed, and bevacizumab will improve progression-free survival and overall survival in this population, as compared to carboplatin, pemetrexed, and bevacizumab alone.

CF patients are adhering to new treatments

AllianceRx Walgreens Prime and the Duquesne University School of Pharmacy have reported that patients with cystic fibrosis (CF) who are prescribed cystic fibrosis transmembrane conductance regulator (CFTR) modulator medications generally adhere to the medications. In a study conducted among 3,482 patients, the proportion of days covered measurement was above 80%. "CFTR modulator therapies are relatively new in the treatment of CF and address the underlying cause of the disease," said Richard T. Miller, MSPharm, MBA, RPh, CSP, vice president of clinical and professional services at AllianceRx Walgreens Prime and an author of the study. "As such, they have the potential to change the treatment of CF. It is important to understand how patients are adhering to these newer therapies."

NIAID funds research on universal influenza vaccine

A universal influenza vaccine with the potential to be longer lasting and more effective than commercially available vaccines is destined for human clinical trials, thanks to a $17.9 million grant from the National Institute of Allergy and Infectious Diseases. The grant was awarded to Versatope Therapeutics, a biotechnology startup founded by the team that developed the vaccine at Cornell and published a study in 2017 detailing its potential. The vaccine focuses on a portion of the virus — the Matrix-2 protein — that remains relatively constant from strain to strain. To properly train the body's immune system to protect against influenza, the Matrix-2 protein is displayed on the surface of bacterial outer membrane vesicles, where it is prominently presented to the immune system upon delivery of the vesicle-based vaccine.

Good results seen for THX-110 in treatment of OSA

Therapix Biosciences, Ltd., has announced topline results from its phase-2a clinical study at Assuta Hashalom Medical Center in Israel, suggesting that THX-110, a combination of dronabinol (Δ-9-tetrahydracannabinol) and CannAmide (palmitoylethanolamide), positively affects symptoms in adult subjects with obstructive sleep apnea (OSA). Among the nine patients who completed the study, 55% demonstrated significant improvement in the apnea/hypopnea index, with a reduction of around 54%. Two patients reported mild side effects, which were resolved when the dosages of THC were reduced to 5 mg/day. In general, THX-110 therapy was well tolerated and exhibited no serious adverse events.

Joint proposal advances in AI Health Outcomes Challenge

A proposal developed by Geisinger and EarlySign is one of 25 accepted by the Centers for Medicare and Medicaid Services to advance to Stage 1 of the AI Health Outcomes Challenge. The joint proposal, titled "Reducing Adverse Events and Avoidable Hospital Readmissions by Empowering Clinicians and Patients," will seek to apply advanced artificial intelligence (AI) and machine-learning algorithms to Medicare administrative claims data in an effort to develop models that predict unplanned hospital and skilled nursing facility admissions within 30 days of discharge, along with adverse events such as respiratory failure, postoperative pulmonary embolism or deep vein thrombosis, and postoperative sepsis. More than 300 entities submitted proposed AI solutions to the Challenge.

Universal influenza vaccine study underway

According to BiondVax Pharmaceuticals, Ltd., enrollment and randomization of 12,463 participants in the pivotal, clinical efficacy, phase-3 trial of the M-001 universal influenza vaccine candidate is complete. BiondVax's M-001 universal flu vaccine candidate has been designed as a common denominator to

influenza A and B viruses. Results from six human clinical trials indicated that M 001 is safe and is well-tolerated, and it induces an immune response to a broad range of influenza strains. The current study will assess how well M-001 protects the participants against flu illness when they are exposed to any circulating flu strain. M 001's single formulation is intended to enable year round production, vaccination, and stockpiling.