

EMS 10

INNOVATORS IN EMS
2014



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Innovation & Advancement

Ten honorees blazing new trails for the future of EMS

By A.J. Heightman, MPA, EMT-P

This is the seventh year of the EMS 10 Innovators in EMS program, jointly sponsored by Physio-Control and *JEMS*. The program has a simple mission but a powerful objective: identify some of the best innovators in the EMS industry and alert the EMS community to their achievements to help providers and patients in the future.

The EMS 10 innovators selection

committee judged this year's nominees on their hard work, dedication and selfless efforts in 2014 and selected the individuals or pairs they felt exhibited the innovations that can have the greatest impact on the future of EMS.

We profile each honoree in this special digital supplement to *JEMS* to not only inform and educate you on their innovative work in EMS, but also to encourage you to ride on the wave of their innovations, use them to better develop your EMS system, and inspire you and your colleagues to think outside the box, take some calculated risks and innovate in an area of EMS that you feel could make a difference for patients, EMS systems or your prehospital colleagues.



Scott Matin, MBA, NREMT-P and **Peter Dworsky, MPH, CBRM, NREMT-P**... Recognized for developing an educational video detailing the need to wear high visibility safety apparel.



Kevin Collopy, EMT-P... Recognized for creating a prehospital Code Sepsis program that resulted in his EMS system becoming the first in the country to be accredited by the College of American Pathologists.



Bill Lang, BA, EMT-P... Recognized for developing one of the most comprehensive and effective critical incident stress management (CISM) programs in Oregon for EMS providers.



Douglas Kupas, MD, EMT-P... Recognized for implementing a statewide protocol for high-functioning CPR teams that incorporates a "pit crew" model.



Peter Antevy, MD... Recognized for developing a revolutionary system for identifying the proper drug dosage to be administered in pediatric resuscitation.



Keith Lurie, MD... Recognized for his research and innovation in the field of resuscitation and in helping to identify the profound consequences that poor quality CPR has on survival.



Randy Budd, RRT, CEP... Recognized for introducing the use of non-invasive positive pressure ventilation (NPPV) in the prehospital setting.



Rachel Phillips, BA (Hon.), PGCE... Recognized for her empowering and motivating approach to clinical training that ensures high standards of excellence in patient care.



Dan Swayze, DrPH, MBA, MEMS... Recognized for developing an innovative community paramedicine program call EmedHealth.



Wayne Zygowicz, MS, EFO, EMT-P... Recognized for his significant research, training and writing on suicide and the need to educate providers to the signs and symptoms of depression in patients and colleagues.

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Bi-Level Impact

Randy Budd improves patient outcomes & saves healthcare dollars by introducing noninvasive positive pressure ventilation to the prehospital setting

For decades, rapid sequence intubation (RSI) has been the most-used intervention for select respiratory care, especially in acute and critical prehospital settings. But Randy Budd, RRT, CEP, EMS captain for the Mesa Fire and Medical Department in Arizona, and a registered respiratory therapist and certified emergency paramedic, wants to change that.



Randy Budd

Budd was involved in the early implementation of RSI protocols for Mesa Fire and Medical more than 10 years ago. “I felt it was inhumane to intubate people who were somewhat conscious, without giving them medication and having intubation be a more sequential process,” he said. He also thought the prevention of intubations could be equally as valuable for patients. “Intubation can cause infection, and it doesn’t go without risks. I thought there might be other ways to provide ventilation without putting an endotracheal tube in their trachea.”

Budd wanted prehospital providers to have the knowledge and training to provide patients in the field the opportunity to be ventilated noninvasively. The more he thought about it, the more he knew that using noninvasive positive pressure ventilation (NPPV), specifically bi-level ventilation, was something providers could learn to execute successfully.

With years of training as a respiratory therapist in both hospital and air transport environments, and with a gifted passion for teaching, Budd set out to introduce the use of NPPV in the prehospital setting as a mainstay in field care.

To implement this change in culture would require a detailed training program and the right technology to train EMTs and paramedics. Budd started with evaluating ventilators that would work effectively and also stand up to the rigors of the prehospital setting.

“We had to select the right piece of equipment,” Budd said. “Technology has been advancing and there is equipment out there that’s being used in the hospital and the air medical industry that is capable of doing noninvasive positive pressure ventilation.”

Since he had extensive experience in prehospital ventilation from his years as a flight respiratory therapist, Budd evaluated 10 different ventilator devices. “I looked at how much they weighed, their capabilities, ease-of-use and consumption of oxygen,” he said. “We had to select the right device, one that would do what we wanted it to do and serve its function long after we purchased it, so it wouldn’t become obsolete the day we put it on our apparatuses. I spent months figuring that out.”

When he settled on the right device, Budd made a recommendation to Gary Smith, MD, Mesa’s medical director, and to the purchasing department at the city of Mesa. Budd then developed a training program for a group of “master trainers”: EMTs and paramedics who would learn the new skills and take them back to their agencies and stations. The

first step in the training was to teach the group new ways of looking at the pathophysiology of the respiratory system, which Budd realized was training they didn’t receive in paramedic school.

“We bought lamb lungs and let the group dissect them. Then we showed them different functions of the ventilator and how it worked on the animal model,” Budd said. “The use of lamb lungs was beneficial to the members because we talked about noninvasive ventilation and lung protective strategies. The providers didn’t understand that because they didn’t get it in paramedic school, but they needed it for this program to be successful.”

Once the group had been properly trained, they were sent to their stations to teach the bi-level NPPV to crews on every shift. Not only did the providers get to learn in a familiar setting with their own equipment, but they also practiced as a crew in assessing and treating a patient using bi-level NPPV.

All providers were also run through ventilator-related scenarios they dealt with daily in the field. They were taught how to adapt to and overcome extraordinary kinds of critical respiratory situations while caring for patients.

In addition to the training program, Budd worked closely with Smith in developing new offline protocols using bi-level NPPV for patients with congestive heart failure, chronic obstructive pulmonary disease and other respiratory illnesses.

Budd admits he had some push-back from people who weren’t convinced such a training program could be successful and that the notion of providing NPPV in a prehospital setting was best left to medical experts at the hospital who are specifically trained in that process.

“I didn’t agree,” said Budd. “Some



Randy Budd, center, has led the charge in training and application of noninvasive positive pressure ventilation (NPPV) in the prehospital setting.

people thought the program was going to be successful and some didn't. But some colleagues out of the hospital, including Budd's medical director, trusted him enough to try to implement the program. "There's always going to be naysayers, but sometimes you have to step out of the box and see if it works or not," he said.

The results speak for themselves. From April through October 2014, bi-level NPPV has been successfully used on 107 people. Eighty-four patients avoided in-hospital intubations, 56 avoided prehospital intubations, and seven were discharged from the ED without hospital admission.

"The majority of patients went to telemetry, with a 4:1 or 6:1 nurse to patient ratio, and they had shorter stays than those who were intubated and went to the ICU," Budd said. "This means their risk for developing an in-hospital infection, such as pneumonia or clostridium difficile, decreased dramatically."

Perhaps most significantly, after receiving the training, providers are reporting that they find bi-level NPPV easy to use, easy to apply, and

highly effective in relieving respiratory distress in their patients.

One of the key steps that were taken with this project was the involvement of regional hospitals, which allows the Mesa Fire and Medical Department to track outcomes and determine the successes of noninvasive ventilation. "Since we've rolled this out in April 2014, we've had more than 84 patients who we've prevented from having in-hospital intubations, in just that short period of time," Budd said. "I don't even know how we would measure that in health-care savings, but it's huge."

Budd wants to make clear that the Mesa Fire and Medical Department still provides intubations when necessary for its prehospital patients, but since implementing the training, the number of those intubations has, and continues, to decrease significantly for the citizens of its community.

Bi-level NPPV is currently used by the Mesa Fire and Medical Department and isn't part of the Arizona EMS' Regional EMS Directory. An article outlining the procedure is detailed in the July 2014 *JEMS* issue, called "Stuck in a Trailer: Noninvasive positive pressure ventilation is intubation alternative." A follow-up article appears in the November issue.

Eventually, Budd would like to see EMTs and paramedics around the country, and around the world, trained in providing NPPV. "The impact this has had on our community on a daily basis is amazing," Budd said. "I think it needs to go regionally and nationally."

When Budd started on the journey of making this training successful, he was designated full time on the department's fire truck. But as the program grew in complexity and success, he realized that it needed his full-time devotion. "I needed to get closer to managing it, so I took a step off the fire truck and took a position in the EMS division as an EMS captain, which is a position I had done years ago," Budd said. "I needed to make sure this program was managed successfully."

In addition to overseeing the training of hundreds of paramedics, Budd has developed formal partnerships with the local hospitals and follows up with their paramedic coordinators on every patient who receives the NPPV modality. He wants information on patient outcomes as they relate to intubation.

"Did we prevent them from getting intubated during their stay at the hospital? Did they need to go to the critical care unit or did their outcome improve because of this being implemented?" he said. "And how many dollars have we saved the healthcare community by not intubating a large number of these patients who in the past would have received intubation?"

Developing and launching the NPPV program has not been easy, but it's been worthwhile for Budd and the department. "I didn't realize the sacrifices I would have to make for my family to run such an intense program," he said. "But when I teach 450 members a new way of doing something, instead of touching one patient, I am touching thousands of patients. The reward of that is immeasurable."

Rethinking Pediatrics

Peter Antevy gives healthcare providers the tools & confidence to save more pediatric patients

If you met Peter Antevy, MD, at a party and asked him what he did for a living, chances are he would say, “I’m a pediatric emergency room doctor.” This answer is the equivalent of calling the Grand Canyon a “deep crater” or Niagara Falls a “waterfall.”



Peter Antevy

Board certified in pediatric emergency medicine, and medical director for multiple EMS agencies, two paramedic schools and a private ambulance company, Antevy has spent much of his professional life working for innovation and change in pediatric healthcare. He’s worked as a pediatric emergency physician at the Joe DiMaggio Children’s Hospital in Hollywood, Fla., since 2005, following six years of training at two top children’s hospitals, but still felt unprepared for his first resuscitation as a new attending physician.

“I felt inadequate because what we had been taught about resuscitation in my residency and fellowship didn’t work,” he said. Antevy, and others in the ED, struggled with how to administer the correct dosages of medication for children. The more resuscitations he performed, the more stressed he became. “Every resuscitation that came was worse for me,” he said.

He forged ahead, trying to calculate the correct dosage of epinephrine or dextrose for children in the midst of a medical crisis. One morning, Antevy sat down with eight common drugs in mind and created a spreadsheet. He calculated those doses for children and listed them as volumes.

“I figured out a system that was age-based and easily understandable to my brain,” he said. After he recognized the pattern of those drug calculations and could easily recall them under duress, he felt present and confident at every resuscitation.

For years Antevy used his system, never telling anyone what he was doing, until a pediatric nurse asked him one day after a resuscitation how he did it. How did he know all the drug dosages by heart?

“I minimized what I was doing because I was embarrassed,” he said. “I thought everyone was supposed to know it.”

A few years later, Antevy gave a presentation on pediatric emergencies to 200 paramedics. In the presentation, he included two slides detailing his trick of calculating pediatric drug dosages.

“The lecture was over and I had 50 people line up,” he said. “They all wanted the last two slides of the presentation on drug dosages. I realized everyone wanted the information that I had been keeping to myself.”

Antevy shared what he knew about the eight drug calculations, but EMS agencies told him they had the same need for dosages of dozens of drugs.

“The next step was to create customized information that every EMS agency uses,” he said. So, Antevy developed a Web-based software program that allows a user to correctly calculate any drug dosage for a child.

“In about 30 minutes, the user can create a customized pediatric medication book for their agency or hospital,” he said. “It’s a robust version of the same system I taught for years. It’s 100% customized and takes the math away from the paramedic during the resuscitation.”

In addition to the software and website, Antevy also created an educational video and “Badge Buddy,” which can be attached to an ID badge for quick reference. “The badge has all the ages and dosages on it,” he said. He doesn’t sell them; instead he gives them out to those who attend his lectures. So far, more than 15,000 people have one.

Antevy stresses that the system, including the badge, equipment and customized medication book, aren’t just widgets. It’s a program he teaches to entire EMS departments to help them understand there’s no difference in treating pediatric and adult patients. “That goes against what is taught in medical, nursing and paramedic schools.”

In his classes, Antevy taught students to remember the calculations by using their hands to remember ages and weights. Someone coined the memory device “the Handtevy Method,” which stuck.

He’s also integrated resuscitation psychology into the system by teaching a concept known as System 1 and System 2 thinking. System 1 is when the brain automatically comes up with an answer, whereas System 2 is when the brain has to stop and think in order to calculate the answer.

“Adult medicine is almost entirely a System 1 process,” he said. “Pediatric medicine, on the other hand, is predominantly System 2, and we have discovered a way to change it into System 1. What has happened is that paramedics and EMTs now see pediatric and adult patients



Thanks to Peter Antevy, education regarding pediatric drug dosage for prehospital providers is spreading across the country and saving children's lives.

lowed to leave the scene unless you have given the child a chance to survive," he said. "We mandate that EMS professionals stay on scene, provide the child with oxygen, compress the chest, and administer epinephrine, without just scooping and running to the hospital. This has helped us save a lot of lives."

Antevy highlights a national study that he coauthored, which was presented at the National Association of EMS Physicians conference in January. Over 19 million run reports were queried and the data showed the rate of epinephrine administration in pediatric out-of-hospital cardiac arrest patients hovering around 38%.

"That means six out of 10 children in cardiac arrest did not get the maximal lifesaving treatment, which is astounding," he said. "Now we give paramedics the tools, so they will stay on scene. They'll be confident, they'll know the drug dosage, and they'll feel comfortable."

Antevy is most proud of the changes in procedures his process has helped make with paramedics when it comes to pediatric medicine and resuscitation. "I can count many saves where kids have been dead on scene, and they've been brought back to life on scene, in front of mom and dad," he said.

He emphasizes that the crux of this work goes far beyond properly resuscitating a child. The process is, in fact, a new way to train the brain. "It's about teaching them why their brain wants to run and then giving them the tools to make their brain say, 'I'll stay,'" he said. "It's about rearranging the tools that we provide to let their brain want to do the right thing. It's a lot deeper than just memorizing a system. It's a culture and mindset change."

Antevy says that the importance of this can't be over-emphasized because of the long-term ramifications of a child's death on the family. "When a child dies, it's not just the death of the child, which is a major thing, but in many cases, it's the death of the family. Parents get divorced and siblings develop major psychiatric problems. I've seen families completely dissolve over the death of a child."

Antevy's innovative resuscitation process has effectively prevented these family tragedies, where a prehospital provider saved a child on scene, instead of panicking and transporting without medical intervention. He uses a recent example of a 2-year-old child who drowned in Miami-Dade County as the kind of success he's striving for across the country. "The paramedic stayed on scene and got the child back," he said. "The child walked out of the hospital two weeks later completely neurologically intact."

For the Broward County doctor, the idea "every child saved is a family saved" is central to his mission. His goal is to provide the tools and education that will empower EMS providers in understanding that pediatric and adult resuscitations are similar and should be approached accordingly.

Antevy, a self-described big kid himself, also sees himself protecting children, who are a vulnerable part of the population that too-often gets pushed aside in medicine. "I think it's my role in life to give kids a voice in healthcare in whatever way I can," he said. "It's the legacy I'd like to leave."

the same. They don't get nervous anymore. They stay and resuscitate on scene."

Over the past two years, Antevy has helped more than 60 EMS agencies move to his system, along with major cruise lines and helicopter agencies. Premier hospital systems, such as the Cleveland Clinic, have also recognized the value the system gives to both its patients and providers.

The effects of Antevy's innovative system on lives saved have been tremendous. He describes Broward County, Fla., as "the epicenter of drowning in the country" because of its high mortality statistics. He witnessed child after child die in the ED from a drowning, which left a deep impact. He wondered why the kids hadn't been resuscitated on scene.

"We now mandate throughout Broward County that you're not al-

Taking the Plunge

Keith Lurie's innovative CPR products have saved thousands of lives

Over the course of Keith Lurie's, MD, more than 25-year career, he's devoted himself to the kinds of research innovations that have saved thousands of lives. He was the first to use intrathoracic pressure regulation (IPR) as a therapy to improve perfusion and lower intracranial pressure.



Keith Lurie

He has invented the impedance threshold devices (ITD) called the ResQPOD and the ResQGARD, as well as the ResQPUMP/ResQPOD combination, which is pending Food and Drug Administration approval. In addition, much of his research has helped to identify the profound consequences poor-quality CPR has on survival.

Many of these game-changing ideas started with a man in cardiac arrest and a garden-variety toilet plunger.

In 1988, a 65-year-old Iranian, medically indigent and suffering from severe coronary artery disease, collapsed in front of his family after dinner. Al-

though they didn't know how to perform CPR, the man's wife and son used the family's bathroom plunger to plunge his chest and revive him. It was the third such episode over several months.

The man was rushed to San Francisco General Hospital where Lurie treated him. The son remarked to Lurie that all critical care unit beds should have a toilet plunger standing nearby because they worked. Everyone laughed. The patient underwent successful revascularization and was discharged from the hospital later that week.

Lurie wrote up the episode in a letter for the *Journal of the American Medical Association* entitled, "CPR: The P stands for plumber's helper."

"We wrote this up because we were intrigued by the possibility of using the downstroke of the plunger to push blood out of the heart and the upstroke to suck air into the lungs," Lurie said.

Despite the humor, the outcome of saving the man's life was serious, and Lurie, now a professor of internal and emergency medicine at the University of Minnesota, thought long and hard about what had happened. With a scientific background and clinical training in cardiology and cardiac electrophysiology, Lurie was keenly focused on treating cardiac rhythm disorders and conducting resuscitation research to try to improve outcomes after cardiac arrest. He has authored or coauthored more than 250 papers on cardiac arrest, resuscitation, hypotension and heart failure.

"Most of my research is in the area of new devices to treat cardiac arrest and, more recently, shock and head injury," said Lurie, who's also the director of a resuscitation laboratory at Hennepin County Medical Center, codirector of the Resuscitation Center, Central Minnesota Heart Center and a cardiac electrophysiologist at St. Cloud Hospital in St. Cloud, Minn.

Over time, and thinking about the toilet plunger incident, Lurie began to study the concept of turning the chest from a passive chamber into an active bellows.

"We made the discovery that if we impeded air from rushing into the lungs at just the time we were pulling up with a suction cup device, we would create a vacuum inside the chest," he said. That would pull more blood from outside the thorax back to refill the heart and pull venous blood out of the brain back to the heart, as well.

"When you push down the next time, you have a lot more blood going to the heart and the brain and the rest of the body," he said. "We turned CPR from a passive process to an active one."

"When you use the ResQPUMP

Many of these game-changing ideas started with a man in cardiac arrest and a garden-variety toilet plunger.

and the ResQPOD together, you get three or four more times as much blood to the brain as you do with just a pair of hands," he said. The combination of active compression-decompression (ACD) CPR and an ITD also has been shown in a landmark study published in *The Lancet* to improve neurologically intact survival from cardiac arrest by more than 50%.

"We have tested that device combination in thousands of patients, so we now know definitively that we can increase survival rates for patients who have had a cardiac arrest by about 50% a year compared with conventional CPR," Lurie said. The combination of the ResQPUMP and ResQPOD ITD is expected to receive pre-market approval from the FDA in 2015.

While Lurie and his team were researching active ACD-CPR with a plunger device, they discovered this also led to a greater preload and cardiac output, which lowered the intercranial pressure on the brain. With this information, Lurie developed the next-generation device called the ResQPOD ITD, which doubles blood flow to the heart with conventional or standard CPR, increases blood flow to the brain by 50% during CPR, and has been shown to increase survival from cardiac arrest by 25% or more.

The National Institute of Health studied the ResQPOD ITD in a large trial from 2006–2010. Part of the study investigated the quality of CPR using the device. The findings proved that when CPR quality is good, the use of the ResQPOD ITD results in a 10% increase in the survival with good brain function for patients with v fib.

“In 100,000 patients that have a shockable rhythm, 10,000 more patients can be living, if you do conventional CPR correctly and use the ResQPOD ITD,” Lurie said. “That possibility drives many of my colleagues to remain doggedly determined and optimistic despite a lot of challenges.”

Lurie and his team also discovered that the creation of a vacuum inside the thorax mimicked breathing. “When you create this vacuum inside the thorax, the vacuum is transmitted immediately to the brain during CPR and that lowers pressures in the brain in a good way,” he said. “Venous blood is pulled out of the brain back to the heart and that provides a way to provide blood flow to the brain the next time you push down.”

This discovery led Lurie to develop a device that impedes or restricts air from rushing into the lungs during the chest recoil phase, creating for the patient a sensation equivalent to breathing through a straw. The device is called the ResQGARD ITD-7.

Lurie worked with Victor Conver-



Keith Lurie's, left, creation of the ResQPOD, ResQGARD and other impedance threshold devices (ITDs) has helped increase survival rates of cardiac arrest patients by more than 50%.

tino, MD, (an EMS 10 2013 winner) to develop the ResQGARD. They tested the device on astronauts coming back from outer space. “When you’ve been in outer space for three months and you come back to Earth, the effects of gravity are profound. Astronauts often can’t stand up,” said Lurie. “Our device has been shown to help treat this kind of orthostatic hypotension: People can stand up longer and think more clearly.”

Now the ResQGARD is found in many resuscitation kits carried by the military and some EMS systems.

Lurie brought the initial ResQPOD ITD idea to the University of Minnesota, but they weren’t interested in developing the technology. Lurie knew it had tremendous potential and decided to proceed on his own. “We pursued it very actively in an animal lab and multiple clinical trials,” he said. “Ultimately we started a company to try to get this technology out there.”

Lurie launched Advanced Circulatory Systems (ACS) in 1997 to manufacture the ResQPOD ITD and became the company’s chief medical officer. ACS was successful from the start. In December 2014, ZOLL Medical Corporation, a manufacturer of medical devices and related software solutions, announced it bought ACS. ACS will continue to operate out of Minnesota as a part of ZOLL’s core products division. The acquisition pleases Lurie.

“I’m looking forward to having a larger company with expertise in resuscitation help us carry the ball forward to get this life-enhancing technology to become a standard of care,” he said.

Lurie is gratified to see the fruition of his decades of work result in thousands of lives saved. As a testament to his dedication, Minnesota now has one of the highest cardiac arrest resuscitation survival rates in the country. More recently, Lurie has helped to discover that elevation of the head during CPR, using the ITD, also improves cerebral perfusion. This simple maneuver is the focus of his next major research effort, which he believes may result in another significant step forward in the field.

“I went to medical school not sure where the path would take me,” Lurie said. “I got involved with research early on to help pay for medical school, and I’ve been fortunate to have mentors who’ve had successes in their own fields of medicine blaze the trail. It’s been inspiring.”

High Visibility

Scott Matin and Peter Dworsky create a free video on the importance of wearing a safety vest on scene

Every day, EMS professionals put themselves in harm's way when working on busy roads and highways throughout the country. Although there to provide care for ill and injured patients, EMS professionals often become victims themselves when inattentive drivers fail to see them,



Scott Matin &
Peter Dworsky

striking them with their vehicles. Over the years, thousands of EMTs, paramedics and first responders have been injured or killed while helping others along busy roadways and highways.

To help address this growing epidemic, a federal regulation went into effect in 2008 mandating that anyone working in the right-of-way of a federal-aid highway must be wearing high-visibility clothing that meets the American National Standards Institute standards. The law applies to all emergency responders, regardless of whether they're paid or volunteer.

Still, many responders are woefully lax when it comes to donning safety vests and other apparel to keep them highly visible and safe when working on roadways. Scott Matin, MBA, NREMT-P, vice president, and Peter Dworsky, MPH, CBRM, NREMT-P, corporate director at MONOC Mobile Health Services, decided to get the word out about the necessity of wearing such safety apparel.

"MONOC is an organization that is safety conscious. Over the years, we have seen the numbers climbing of EMTs and paramedics who get struck on roadways at the scene of an EMS call," Matin said. "And that number is growing. So we thought about how to reduce the risk of those getting injured or killed on scene."

The two took a hard look at high-visibility safety vests as an effective way to provide more safety to prehospital responders, since so many elect not to wear them. "We wanted to think of a way that we could make this more evident and get people to understand why it's so important to wear these vests," said Matin. "We thought, a picture is worth a thousand words. If we could show how visibility changes in both day and night, with a vest versus without a vest, it might get people to wear the vests like they should."

One of the barriers to wearing the safety vests, according to Dworsky, is a lack of knowledge about how effective they are in providing visibility, both day and night. "They don't realize that the vest actually does what it's supposed to do in making them visible," he said. "That this simple piece of material can actually protect them in a high-hazard environment."

The dominance of dark-colored clothing provided to most prehospital providers doesn't help matters either. "In the EMS community, we tend to wear dark uniforms, dark pants and jackets," Dworsky said. "If you look across Europe and Australia, their standard uniform is made of high-visibility materials, and they're always wearing it. We're slowly moving toward adopting the philosophy of always being visible, but we're still behind the curve in the U.S."

To combat the potentially deadly mindset, Matin and Dworsky decided to produce another free safety video (their last free video, about the misconceptions of emergency light and siren use, earned them EMS 10 recognition last year) aimed at EMS providers that would not only explain the importance of wearing a high-visibility safety vest, but also show the difference in how pre-hospital workers look wearing one versus not wearing one, during the day and at nighttime.

With the help of their team, Scott and Peter produced a video called "High Visibility Safety Vests: Be Safe—Be Seen." Creating the video took months of preparation and planning.

"First we needed to make sure we had our facts straight, and we needed to make sure we conveyed in a short amount of time the exact benefits of wearing a vest," said Matin. "We needed to show them *visually* why they should be wearing a vest."

The two raised \$4,000 through donations, conducted research about the issue, wrote and revised scripts, developed a list of scenes to be shot and created a shooting schedule. They had to line up ambulances and other vehicles as props and recruit staff within MONOC to participate as actors. The actual filming took two days, followed by weeks of editing. "Coordinating the details and the logistics is the hardest part," Matin said. In fact, the date of the shoot had to be changed twice due to bad weather.

Without preplanning, the production would've taken much longer and cost more. "We came up with a shot list ahead of time, so we knew exactly what we wanted to do as the day progressed," said Dworsky. "We have a preset list of shots, and we stick to those as best we can. We've learned



The video “High Visibility Safety Vests: Be Safe—Be Seen,” produced by Scott Matin and Peter Dworsky, has educated EMS personnel of the importance of wearing high-visibility safety vests on scene.

that guidance from the production staff is key.”

Matin and Dworsky secured permission from the State Highway Authority to access a roadway that had been shut down because of construction. On the day of the shoot, they captured all the inside images they needed and then traveled to the roadway the next day for the outdoor shots. Because they wanted to illustrate the difference between providers in their standard uniforms wearing and not wearing a vest, day and night, the shooting went from 8 a.m. to 11 p.m.

“We were really able to show that even in the daytime, people with a safety vest were markedly more visible than ones not wearing a vest,” Matin said. “We did the same thing at nighttime and it was obvious.” In fact, one of the nighttime shots in the video shows EMTs and paramedics walking away from the camera. The two not wearing safety vests become almost invisible, even in headlights.

Upon completion, the video was posted on MONOC’s website (www.monoc.org/safetyVestPSA.cfm). “We made the video public domain,” said Dworsky. It can be downloaded for free by any agency. So far, the video has been downloaded or sent to agencies throughout the United States, Canada and Europe.

Matin emphasized that wearing a safety vest is an important part of a multicomponent approach in prehospital providers staying safe on the streets. “One of the things we stressed in the video is that we can’t control every variable every time,” he said. “There are so many variables when it comes to provider safety: weather, the amount of lights on a vehicle, the type of roadway, what you’re wearing, the number of people on scene. But we thought the safety vest is something that everyone should be wearing automatically, and we really pushed that during the video.”

Dworsky echoed the sentiment of offering providers numerous avenues of education, which comprises a “toolbox of safety.” “In that toolbox are memos, policies and educational programs. The video is one of the programs, and the actual safety vest is another tool in the box,” he said. “No one item is going to fix the problem, but this video is a true visual representation. You can’t talk about this in a memo or email. You have to be able to see it.”

Both have been heartened by the positive response the video has received from the EMS community, especially since many agencies are now including the video as a viewing requirement. “These are being written into the policies for agencies throughout the world. That says a lot for the EMS community,” Matin said. “They realize these things are important, and that they are going to take the time to train and educate their people to keep them safer. They realize the video is something everybody should be seeing.”

While the two are pleased with the reaction the video has received, what they want others to understand is just how important it is to take the message of the video to heart by dumping the “It will never happen to me” attitude and donning the vest. It takes only a minute to put it on, and that simple act may one day save your life.

“We’ve been fortunate not to have anybody struck by a vehicle on a roadway,” said Dworsky. “We’ve been lucky over the years, and we would like to stay fortunate. Part of that is everyone taking responsibility for themselves.”

Matin agrees. “There’s a lot of luck that’s involved in provider safety. But we don’t want to rely on luck, we want to rely on science,” he said. “There is a lot of luck in keeping us safe, and we’ll take it when we can. But we don’t want to count on it.”

A New Approach

Rachel Phillips supports her London Ambulance crews with personal and personalized clinical training

Rachel Phillips, BA (hon.), PGCE, was working in information technology in London when the planes hit the World Trade Center in September 2001. The event ended her career and sent her life in a completely new trajectory.



Rachel Phillips

“My work just dried up and my company struggled to find me work,” she said. “I was going through a period where I felt I wanted to help society and give something back, so I thought I would take the opportunity to move into something completely different. I already had the desire to help in me, but what happened on that day in September was the icing on the cake.”

She talked to her brother, who’s a paramedic in the London Ambulance Service. She wanted to join, and he encouraged her to do so. In 2002, she became an EMT.

The London Ambulance Service is governed by the country’s National Health Service, which covers the whole of England and is completely separate from the fire and police departments. Phillips took to the work immediately. After working as an EMT for four years, she became a paramedic.

“I knew I wanted to be a paramedic, then a training officer, within the first week of school,” she said. “I gave myself 10 years to do it. I managed to do it in six.”

Despite her success, Phillips’ desire to give back, coupled with her years of teaching, came to the forefront. She wanted to do more, particularly in training, so she became a training officer for two years and then moved into the role she has now as a clinical tutor supporting technicians and paramedics in ongoing clinical and professional development. She’s based at Greenwich Ambulance Station in London.

The main focus of Phillips’ work is on the continuing education of staff in order to ensure clinical and professional standards remain high in the London Ambulance Service, which attends to 6,000 patient calls daily. With wildly varying schedules and the numbers of people in need of training, Phillips has had to be flexible, empowering and motivating. Her methods have helped clinical team leaders run practical training sessions to build their skills in trauma, obstetric emergencies and advanced life support.

Phillips sees her role as two-fold. As a clinical tutor, she must continually identify staff training needs and develop specialized training workshops around those needs, all while negotiating tight schedules for trainees who are frequently in the field. Second, she must accomplish this with an enthusiastic and motivating approach. It can be a tricky dance.

“I undertake discussions with the station managers about negotiating stand-down time for team leaders, so that we can organize and deliver critical training workshops,” she said. “I aim to ensure that the team leaders have the time to prepare their sessions, equipment and teaching

material. By empowering them to refresh staff members with their clinical knowledge, the team leaders become remotivated within their role.”

Phillips also has developed a unique “reflective practice,” which is a professional requirement stipulated by the agency’s regulator: the Health and Care Professions Council. The practice encourages other prehospital providers to think deeply about approaches they have on critical calls and how the call might be better handled or understood.

“The idea of the reflective practice centers on critical reflection as a fundamental process, which enables us to learn on a daily basis and learn from cases we attend,” said Phillips.

She admits that the concept is new to the prehospital providers at her agency and has been challenging to implement. “It’s been a challenge for the frontline staff to use critical reflection on a regular basis,” she said. “It’s hard to come home after a long 12-hour day and sit and write essays relating to patients seen that day.”

Phillips had tried to lead by example in this process by publishing her own reflective practice on a call she responded to. “Some frontline staff are reluctant to reflect. My reflection made me think about how I would react the next time I was faced with that issue, and what I learned from it,” she said. “I wanted to demonstrate how reflective practice leads to improvement and to us ultimately becoming better clinicians.”

This shared approach to learning is a cornerstone to Phillips’ approach to training, where staff often work in isolation and have limited opportunities to evaluate best practices for the clinical treatment of patients. By sharing experiences, Phillips makes space for her colleagues to discuss their experiences and trade valuable information around clinical prehos-

pital treatment. Where this turns out to be most beneficial is in colleagues openly admitting mistakes.

"We're human and we make mistakes. We work long hours with little time to update or refresh ourselves in our knowledge and skills," Phillips said. "I absolutely recognize this and encourage frontline staff to come and talk to me when they feel they have made an error. Being open about this leads to a process of learning and then changing how we do things to improve our practice."

Without this transparency, Phillips is convinced staff members might try to hide errors, which impairs patient safety and can lead the member to being dismissed from their duties.

"I have crews coming into my office to ask my clinical advice on cases they've attended," she said. "Recently, I had a crew come into my office confused about another paramedic's practice that they had witnessed at a traffic collision. The crew left with a greater understanding and felt more confident about dealing with such an incident in the future. We work in a challenging environment, and I aim to reduce the stresses that staff can be placed under in the best way that I can."

Phillips is acutely aware of the pressures her colleagues are under, especially when they operate in a healthcare environment that's supported by the government taxpayers and, therefore, free to most citizens. With thousands of calls coming in daily from London's residents, prehospital providers find they have little time to update or familiarize themselves with new and existing processes and procedures.

"The environment is forever changing, with the latest research identifying new ways to treat patients or new drugs to administer to various presenting conditions," Phillips said. "Skills such as needle chest decompression are performed so infrequently that paramedics struggle to remember the correct methods when placed in the situation. Without constant training and



Rachel Phillips, center, has been an integral part in implementing quality paramedic training, development and high standards of patient care within the London Ambulance Service in London, UK.

critical reflection on cases, the process of learning doesn't take place. That can be the difference between a good and poor clinician."

Phillips has also been keenly focused on her department's "Return to Practice" package, which targets staff members who've been away from work for six months or more to be clinically supported when they return to work.

"It's important to sit with the staff member on the first day of their return and identify their individual training needs, so they receive a training package which addresses these needs," said Phillips. "The package can involve a combination of theory-based learning, practical sessions and self-directed study. And processes of evaluation are put into place to ensure the staff member has reached the required level of learning."

The training package is completed through a period of third staffing shifts on a frontline vehicle and a clinical ride out conducted by a team leader, who assesses that the staff member is ready to return to frontline duties. "It's vital to provide the staff member with this period of support and guidance to make coming back to work an easier process," Phillips said.

Her sheer enjoyment in training has inspired paramedics and team leaders across her agency to enhance their own clinical skills. Several staff have subsequently undertaken their own ongoing professional development in raising their standards of conduct and care. As a result, the local clinical performance indicator compliance, a standard quality of care measurement, has increased. Phillips sees clinical training as the linchpin to this success.

"This profession is constantly being updated due to the latest research and evidence-based practices, and it's vitally important to ensure that the public is being assessed and treated according to those clinical practices," Phillips said. "Constant training can enable frontline staff to attend to patients more confidently and feel they are guided and supported in what can be a challenging role. The benefits of that knowledge are conducive to a more confident workforce."

Crisis Therapy

William Lang addresses the emotional and psychological aspect of EMS by pioneering a critical incident stress management program to help his fellow first responders

More than two decades ago, William “Bill” Lang, BA, EMT-P, left a career in pastoral ministry to pursue his interest in emergency medicine. The draw to EMS started as far back as high school when he volunteered as a firefighter and first responder for the local volunteer ambulance company. Still, his desire to serve people stayed with him and he



William Lang

began to focus on those who struggle professionally in emergency medicine.

“Over the years I’ve watched a number of EMS personnel disintegrate in the field,” said Lang, who’s lead paramedic and critical incident stress management (CISM) coordinator for American Medical Response (AMR) in northwest Oregon and southwest Washington. “I’ve seen several people die pretty young, and I’ve seen them break down psychologically and emotionally. Others developed a pattern of behaviors and made decisions that were career ending.”

These incidents left a mark on Lang, but it wasn’t until 1998 that he came up close and personal with his own critical incident—one that would change his life forever. He and his partner had been called to the shooting of two police officers. They quickly found themselves in the hot zone of potential gunfire.

“We declared one officer dead on scene and treated and transported the other. In the process we were brought under threat of fire, although no gunfire happened while we were there,” said Lang. “That incident ended my partner’s career, and it almost ended mine.”

Lang developed some of the classic symptoms of critical incident stress, including the dread and fear of going to work. With help he recovered, and then he developed a keen interest in understanding how to survive critical incidents and CISM.

“Looking after people and making sure they have the resources and the internal skill set to do what they need to do in critical incidents has always been on my mind,” he said.

In 2005, his chance to do something about CISM became a reality when AMR entered a contractual obligation that required the company to have a CISM program in place. The company already had a few pieces, but it was far from a working program. “I was getting requests at times to talk with coworkers after a bad call, but I realized that wasn’t really a program,” Lang said. He talked to his general manager about restarting the program. Lang was appointed the coordinator two years ago.

Lang started his quest to rebuild the program with reading and research, and is indebted to the International Critical Incident Stress Foundation (ICISF) for their support. “They have a lot of great information and ideas and have really tried to hone in on what works and what doesn’t work,” he said.

The whole idea of addressing critical incident stress is a controversial one, as the mental health community has pushed back some about

having these programs in emergency service environments. Lang recognized that he would have to keep this in mind if the program was to be successful.

“It’s a specialty in mental health to work with people affected by traumatic incidents,” he said. “So what the ICISF came up with is the need to have a multicomponent program in place. That involves, among other things, pre-incident education.”

To achieve this education, Lang would need to build a program that would educate his providers in the signs, symptoms and treatments of critical incident stress. He also would need to develop peer-to-peer support resources. “We needed to train selected field personnel in psychological and emotional first aid,” he said. “That’s the first line of intervention for people who have been exposed to critical incident stress.”

Once trained, these peers would support their fellow coworkers in addressing CISM, but they wouldn’t be engaging in actual professional mental health treatment. “When they see an individual with what looks like symptoms of critical incident stress that are deeper than their training, they can refer them to a licensed mental health professional or counselor,” said Lang.

The more Lang researched the material from the ICISF, the more he realized he could design a CISM program based on an EMS system. “EMTs and paramedics are very used to coming in, identifying a chief complaint, coming up with a treatment plan, and then transporting that person to someone with an equal or higher level of medical training,” he said. “So if you use that as a model for CIS management, EMS providers already understand that process.”

With his research completed, Lang outlined for his superiors how

the program could effectively work. “CISM is to psychotherapy what first aid is to surgery. It’s seen as part of a continuum of care,” he said. “That’s how I decided we would present the idea.”

It worked. From there, Lang put out the word that he needed peer counselors for the program. He did it by asking the workforce whom they would want at their side if they were having a crisis. He received more than enough nominations for the program and selected 14.

“The peer counselors are doing critical incident stress diffusing, not debriefing. It’s a scaled-down, more casual and shorter duration form of debriefing,” Lang said. “The peer counselors do a follow-up contact with the people they’ve seen to find out if there’s more discussion needed, or if there’s a need to get the person connected with a therapist.”

To run such a program, Lang discovered that a licensed therapist had to be formally associated with them, one who would act as a professional partner. They found such a therapist in Drew Prochniak.

“We were so fortunate in finding a fellow who specializes in first responder stress that was setting up a practice as a therapist in our community,” Lang said. “He jumped on the bandwagon. This couldn’t happen without his involvement because the model wouldn’t work.”

Prochniak has adapted to his new role with gusto, riding with paramedics and EMTs and becoming known on a first-name basis. Lang couldn’t be happier with the results. “Historically, getting paramedics and EMTs to go and see a counselor has not been something that was popular,” said Lang. “It’s seen as weakness and we’ve had to overcome all that silliness.”

There’s also the logistical challenges with which Lang contends. AMR’s workforce spans 500 people across four metropolitan counties. “They all work different schedules, have different operations, and differ-



William Lang, left, with support from the International Critical Incident Stress Foundation (ICISF), developed a critical incident stress management (CISM) program for fellow EMTs and paramedics. The program has aided his fellow first responders to great success.

ent management teams,” he said. “It’s like herding cats.”

Despite some of the initial hurdles, the program is a success. Lang is pleased and grateful for this because he recognizes the importance of having such a program in an industry where jobs are getting harder to execute. The squeeze on resources, the complexity of challenges facing many patient populations, more violent and mentally ill patients, and more gun violence and drug abuse all contribute to the difficult hazards prehospital providers face every day. New threats, such as terrorism and Ebola, only add to the mix.

“We really weren’t facing this stuff 20 years ago to the degree that we are now,” said Lang. “More accountants and attorneys have gotten into the leadership of healthcare, and that has changed the environment significantly. So we are doing more work with fewer resources.”

More advanced technology also has added to prehospital provider stress. Twenty years ago, an ambulance might have had a radio, pager and map book. Today, that same ambulance has two radios, computers, pagers, monitoring equipment and GPS. Ultrasound is expected to be added to ambulances in the next few years. “So we are expected to know more and do more than we did previously, and we’re expected to do it faster, with more volume, in a shorter period of time,” Lang said. “There’s a personal price providers pay for being out there and attempting to do all this work.”

As such, the need for CISM programs has never been greater. It’s a challenge Lang is uniquely suited to, given his background and outlook on life. “One of my old partners said, ‘You can love EMS, but it will never love you back.’ But I’m thinking that maybe there is a way that we can look after each other,” he said.

And Lang has proceeded to do just that with his much-needed program. “I think that we find the goodness of life in our efforts to make someone else’s bad day survivable,” he said. “I’ve been very gratified with the reception we’ve gotten.”

Healthcare Connection

Dan Swayze leads Pittsburgh's community paramedicine program to help high-risk patients

More than a decade ago, Dan Swayze, DrPH, MBA, MEMS, started envisioning an innovative, pioneering community health initiative that involved EMS personnel in nontraditional roles. As director of prehospital care at

the University of Pittsburgh Medical Center (UPMC) at the time, Swayze had already been involved with medics acting as community health advocates. But he wanted to take the conversation—and the model—much further.

“My mentor, Dr. Paul Paris, and I had several discussions about the financial challenges facing EMS agencies. To us it was silly that we spend all this time training paramedics to be clinicians and yet the healthcare system just pays them for the medical transportation services they provide,” said Swayze, who’s now vice president and chief operating officer for the Center



Dan Swayze

for Emergency Medicine of Western Pennsylvania Inc. “So we started exploring ways to use medics in different roles.”

One of the big stumbling blocks encountered by the first attempts to expand the scope of practice for prehospital providers was devising a model that was unique and financially sustainable. “Projects either duplicated services that other practitioners were providing, or they didn’t carve out enough value.”

So Swayze and Paris found grant money in 2003 from the Richard King Mellon Foundation to develop a program that would train EMS providers to act as community healthcare advocates. These providers would engage patients in their homes, assist with the self-management of their disease, connect them with resources on a variety of levels, and ensure a safe environment. The result would be healthier, more independent patients, fewer visits to the ED, fewer hospital admissions and reduced healthcare spending.

They called the project Emed Health.

“At that time we weren’t sure if it would work, or if EMS agencies would even be interested in it,” Swayze said. “We were training providers in a variety of different disease management and injury prevention programs to see what would resonate and to see what would happen if we eliminated the financial barriers to offering those programs.”

Since then, the community paramedicine program has grown in stature and importance for the communities it serves. Its newest iteration, the CONNECT Community Paramedic program, spans 45 EMS agencies in Pittsburgh and the surrounding county. Part of the reason for the success is the alternate perspective given to paramedics who join the program.

“When we train paramedics in the traditional way, they’re taught to look at the patient as just a collection of organ systems that have broken down by injury or disease. We train them to try to stabilize those problems until they can get the patient to definitive care at an emergency department,” Swayze said. “In this new role, we ask them to step back and look at the

individual in the context of everything else that’s going on in their life.”

Swayze retrains providers to assess a patient’s social support, income and transportation resources—the kinds of things that most of us take for granted. “Ninety percent of the work that we do falls under the social services category, where we are just trying to link vulnerable patients to resources that they need as an alternative to calling 9-1-1.”

What’s unique about Emed Health and the CONNECT Community Paramedic program is the multiple agencies, hospitals and funders involved. Grant money provided by the two competing healthcare systems enabled Swayze to place a team of community paramedics in the county to help high-risk patients identified by either EMS personnel in the field or the social workers and care managers at the hospital.

Over the past decade, Swayze has confirmed that paramedics can effectively administer a variety of different interventions to patients. Programs offering immunizations, asthma disease management interventions and congestive heart failure assessments designed to keep patients from being readmitted to the hospital have all shown promising results.

Their work has also had an influence on more traditional functions for EMS, like bioterrorism preparedness. About eight years ago Swayze’s team oversaw a simulated viral disaster, proving EMS was ideal to help distribute mass vaccinations. The program, called RapidVax, would test how quickly vaccines could be distributed in the event of a viral outbreak among a large population. Swayze and his team worked with the city EMS agency in Pittsburgh and asked the press just 24 hours beforehand to announce that free pneumonia vaccinations would be

provided to any senior citizen at four locations the next day. Swayze didn't pretrain the paramedics, nor did they receive days of advanced notice.

"We met with them literally the morning of the event for 30 minutes, reviewed how to give intramuscular injections and talked about contraindications for the pneumonia vaccine," he said. "We gave real vaccines to seniors who should have been vaccinated against pneumonia. It was an interesting way for us to explore all the different nuances of rapidly deploying vaccines and the kinds of situations we could expect when dealing with seniors."

These scenarios were so successful that the UPMC Health Plan asked Swayze to oversee biometric health screenings of their employees. They recognized the success Swayze's paramedicine program had in administering vaccines and wanted to see if the same success could be achieved when conducting 200 biometric screenings. After two months of success with the pilot screenings, the program was expanded to all employees at UPMC—screening about 15,000 people in its first year.

"It's been a successful partnership for a long of time," Swayze said. "We provide the clinical staff and they provide the health coaches. Together, we give the employees their results and explanation of what the numbers mean, and what, if anything, they need to do about it, all within about 20 minutes."

Initially when Swayze and Paris conceived the community paramedicine idea, they surveyed some of the EMS constituents to find out why more didn't run the program they were offering. Not surprisingly, they found the agencies lacked the time and manpower to go out on calls, do their billing and operationalize these new and unfamiliar programs. Most agencies didn't know which community stakeholders they should partner with to make their programs successful.

"Running an EMS service is incredibly complex without expanding the scope of the services they provide,



The CONNECT Community Paramedicine program in Pittsburgh, developed by Dan Swayze and Paul Paris, has grown rapidly from its early days into a beacon of a successful community paramedicine program.

so we've spent the last 10 years working on models that are evidenced-based and cost-effective," Swayze said. "We then work closely with the EMS managers to implement the program back at their stations."

In March 2014, Swayze had the opportunity to travel to Washington, D.C., with three other colleagues to meet with Patrick Conway, deputy administrator for innovation and quality at the Centers for Medicare & Medicaid Services. Conway was impressed with the concepts of community paramedicine and mobile integrated healthcare. They discussed the role of community paramedicine programs and how they might be expanded on a broader level.

"From that discussion it was clear that we need to do a more robust evaluation of the impact of these programs and prove the value they can have in the healthcare system," Swayze said. "But they were definitely interested in our early results."

Swayze stresses that Pennsylvania's community paramedicine programs, and the many across the nation, wouldn't be successful if it weren't for the deep commitment of the paramedics and EMTs who make it their life's mission to help patients.

"We have an unbelievable team of medics that come from all different facets of the EMS community," Swayze said. "Our program gives those medics an opportunity to develop deeper relationships and rapport with their patients and learn that these vulnerable patients are survivors. Whether patients are dealing with mental health or substance abuse issues, whether they're elderly, alone, afraid, or at the end of their life, we want to do our best to help them improve the quantity and quality of their life."

Swayze looks forward to continuing the program that's had so much impact on so many, particularly when he sees the potential to help EMS providers continue to provide service to their communities.

"We've come to this period of time when the traditional healthcare system isn't able to help some patients," he said. "In the beginning, we weren't sure this was something that medics would want to do. It's been so cool to see the impact our medics can have with their patients. When we connect these incredible medics with the patients that need help, just unbelievable magic occurs."

All for One

Douglas Kupas unites Pennsylvania's EMS by helping create statewide BLS & ALS protocols

In 2000, the commonwealth of Pennsylvania didn't have statewide protocols in place to guide patient care by EMS providers. While somewhat controversial, protocols can reduce variations and support universal evidence-based care. At the time, Douglas Kupas, MD, EMT-P, had

taken a position as the commonwealth EMS medical director for the Pennsylvania Department of Health.

"I was in the role two years when physicians from various places across the state, including the Pennsylvania College of Emergency Physicians, came to me saying it makes sense for us to do this statewide," he said.

So in 2002, Kupas, who's also an EMS physician at Geisinger Health System in central Pennsylvania, gathered a group of 80 people from across the state's Medical Advisory Committee and Regional Councils.

"We developed task forces and a process to draft and approve statewide protocols. At the time we had 16 regions, so we made sure we had statewide representation from each of the regions on the subcommittees," he said.

The group finalized BLS protocols, which became official in 2004. Statewide ALS protocols followed in 2007. "Pennsylvania now has the largest population in the U.S. covered by a single set of EMS protocols," said Kupas. "We weren't the first to have statewide protocols, but we are the largest population covered by a single protocol."

Kupas acknowledges that Pennsylvania's protocols haven't always followed national guidelines. In some cases, the protocols have been put into place before the national guidelines have been adopted. "For example, in 2007, we had five things in our protocols that weren't consistent with national resuscitation guidelines," said Kupas. "In 2010, when the national guidelines changed, all five were in the new national guidelines. We've always tried to be evidence-based, but we've not been restrained by walking lockstep with national guidelines, when evidence has progressed beyond the guidelines."

In 2013, Pennsylvania developed a statewide cardiac arrest protocol as part of its protocol updates. Dramatic in its change, the new protocol incorporated two things. It focused on the science of uninterrupted chest compressions and then outlined how to implement the protocol by using high-functioning CPR teams in a pit crew approach to put the science into practice.

"The standardization and efficiency in the pits during NASCAR races is similar to time-dependence in the care of a cardiac arrest patient and calls for a pit crew approach to resuscitation," Kupas said. "We weren't unique in being the first to do this. What was unique was having a statewide protocol focused on continuous chest compressions during cardiac arrest that applies to the more than 1,000 EMS agencies in the state."

Kupas recognized training would be needed to ensure EMS provid-

ers and leaders understood why the protocol changes were necessary and how to properly implement them.

The Pennsylvania HeartRescue Project partnered with the Bureau of EMS to develop a four-part training program to accomplish these goals. The first part required the launching of resuscitation academies geared mostly to EMS managers and directors to get their buy-in to the concept. The second part was a 90-minute online continuing education course that taught EMS providers how to turn the protocol science into pit crew action. A continuing education course that allowed hands-on high fidelity simulator pit crew training made up the third part. The fourth part consisted of crews engaging in their own mini pit crew trainings on the fly with simple manikins. "At shift change, crews would practice the pit crew techniques with each other," said Kupas.

In the first six months of 2013, 26,000 EMS providers took the online and in-person science to the pit crew courses. More than 7,000 took the hands-on high fidelity simulator course.

"The numbers for the online course weren't surprising because that's the way we educate people about protocol changes. We have a statewide learning management system that makes courses and protocol updates available to all EMS providers across the state," said Kupas. "The part that surprised me was the number we were able to get into during the hands-on portion."

The trainings were taken one step further by engaging EMS providers' naturally competitive spirit in the first, statewide high-performance CPR video contest. EMS agencies were asked to submit a video of their best team responding to a specific cardiac arrest simulation. The first-place team



Douglas Kupas

would star in the video that's used for statewide and national trainings. In addition, the winner received a trip to Las Vegas to attend the Emergency Cardiovascular Care Update Conference.

"The Pennsylvania HeartRescue Project coordinated the video contest to award the EMS agency or group that performed the best example of a high-functioning CPR team working with our new protocols," Kupas said. "It turned out we received so many good videos that the winning agency was highlighted in the final version, but clips from many of the videos were used to highlight important concepts in our protocols and the pit crew approach."

The winning video submissions were featured in a high-performance CPR training video used to assist all EMS agencies in the implementation of the new protocol (<http://youtu.be/KhNPgHWq5Ek>). More impressively, in October, a Pittsburgh EMS crew won first place in the CPR competition at the 2014 EMS World Expo in Nashville, Tenn., where they competed against 30 teams from around the world.

As part of a cooperative effort among the Pennsylvania HeartRescue Project, the Pennsylvania Department of Health and the American Heart Association, Kupas and many others have incorporated citizens in the chain of survival through the Lend a Hand, Save a Life CPR Challenge, launched in 2012. The program succeeded in training more than 300,000 citizens in hands-only CPR its first year. To date, over 730,000 have been trained. The campaign teaches the three critical components of bystander CPR. The first is how to recognize a cardiac arrest and to call for help, the second is how to do compression-only CPR, and the third is to find an AED, if available.

The Lend a Hand program has been rolled out at sporting events, hospital lobbies, shopping malls and places of business. "We rely on EMS providers and agencies across the state to take this out wherever they are,"



Douglas Kupas, second from top left, helped not only develop statewide BLS and ALS protocols for Pennsylvania, but also the first, statewide high-performance CPR video contest to further educate EMS providers around the state.

Kupas said. "We have cards that we give out to everybody that completes it. The program introduces people to how easy it is to do hands-only CPR."

"You can't be successful by concentrating on just one aspect of cardiac arrest care. If we just concentrated on the EMS CPR protocol, that doesn't help if people aren't getting CPR from a bystander before EMS arrives," Kupas said. "We keep it very simple. It takes five minutes to teach somebody how to do it. Recently, we began to turn our attention to improving the rate of cardiac arrest recognition and telephone CPR from our partners in the dispatch centers."

As one of the states in the HeartRescue Project, every EMS agency in Pennsylvania can track the success of their cardiac arrest treatment through the Cardiac Arrest Registry to Enhance Survival (CARES). EMS agencies throughout the state enter information about cardiac arrest calls into a central database. "That allows us to follow by agency, region, and state how our cardiac arrest performance is going," he said. "We have about 70% of the state's population covered in the CARES program."

A comparison of cardiac arrest survival for agencies in CARES, in both 2012 and 2013, showed a 16% relative statewide increase in survival with good neurologic outcome for out-of-hospital cardiac arrest. This translates to about 167 additional lives saved in the first year of the new protocol. The statistics also show a 22.3% relative increase for bystander CPR, which may be in part due to the outreach conducted with the Lend a Hand campaign.

"The impact of taking something that the science shows works and getting it out statewide to EMS providers, and then being able to see measurable increases in survivors, is extremely satisfying," Kupas said. "I get to see some of those survivors myself. I talk to them in the hospital after they have awakened, I see them at EMS conferences, and I run into them on the street in my community. This is a program where we are seeing results across a whole state, and it's truly the result of thousands of people who have embraced the program and who are working together to save lives. The impact of that is very gratifying."

One Step Ahead

Kevin Collopy spearheads his service's initiative to improve sepsis treatment in the field by becoming the first EMS service to do point-of-care serum lactate testing

It all started with a problem.

"Our hospital's chief operating officer (COO) went to my director and said, 'We need your help,'" said Kevin Collopy, EMT-P, clinical education coordinator at New Hanover Regional Medical Center's AirLink/VitaLink Critical Care Transport, located in Wilmington, N.C.



Kevin Collopy

The COO pointed out that in 2011, New Hanover Regional Medical Center's (NHRMC) severe sepsis mortality rate was just below the national average of 14%. When they looked at patients who had been transferred to NHRMC from other area hospitals, those severe sepsis mortality numbers exceeded 47%. The team in AirLink/VitaLink were asked to help find a solution to the problem.

Collopy and his leadership believed that if they could begin sepsis treatment in the field, it would save lives and improve outcomes.

Collopy's director turned to him and asked, "What do we need to do?"

As the person responsible for overseeing the education and clinical care for AirLink/VitaLink, Collopy honed in on two things. First, providers would need to know with absolute accuracy what they were treating. Second, providers would need to carry antibiotics on AirLink's two helicopters and VitaLink's six ambulances to start treatment for severe sepsis patients in the field. To do that, AirLink/VitaLink Critical Care Transport would become the first EMS system in the country to be accredited by the College of American Pathologists (CAP) as a point-of-care testing lab.

"This accreditation is something NHRMC's core lab said we had to do for our patients," Collopy said. The hospital's lab was clear that the transport agency had to be accredited if it wanted to perform point-of-care labs on its patients. And this accreditation would need to come from CAP, the gold standard of accuracy and reliability in providing patient lab testing.

"I was naive to all the nuances and the specifications of how to draw labs accurately, how to handle blood, and how to perform ongoing line quality assurance and quality control on a monthly and quarterly basis," Collopy said. "There are so many pieces to it that it was overwhelming. Fortunately the NHRMC core lab team supported us."

"For us to achieve accreditation, we would need to meet nearly 5,000 standards," said Collopy. "We couldn't miss one of them. It was a huge project to undertake."

CAP listed the processes and procedures that needed to be followed, and provided books of standards and the laboratory policies that would need to be met and implemented.

"After reviewing these new standards with our core lab, we said, 'If this is going to help us impact our patients' lives, then we need to do it,' said

Collopy. This meant a significant investment in time and resources.

AirLink/VitaLink purchased a blood analyzer and provided the tool to its providers to use in the field. "For every result we obtain with our EPOC blood analyzer, we write a protocol that could change patient care. We track these care changes monthly," Collopy said. "We've found that nearly half the time someone runs labs in one of our vehicles, they can directly link that to a change in the care provided to that patient."

The effort has increased compliance with early antibiotics by over 75% in code sepsis patients. "There are patients whose outcome is changed because we brought this technology to them instead of waiting to get to the hospital to run it," Collopy said. "By delivering care earlier, we can provide patients a faster level of care while also helping save valuable healthcare dollars."

It's this kind of innovation and attention to detail that resulted in the CAP granting AirLink/VitaLink its first accreditation as a point-of-care testing lab in September 2013. AirLink/VitaLink was reaccredited in 2014.

As part of the accreditation, Collopy designed and implemented a training program to train all of the agency's providers in recognizing the signs and symptoms of severe sepsis. Then they were trained in the best ways to confirm the diagnosis and treat the malady. While most providers can recognize the signs of sepsis, severe sepsis can be missed.

"In severe sepsis, the lab value we care most about is the patient's serum lactate level," Collopy said. "The hospital is able to use our field-obtained serum lactate level as their baseline trended over time to determine whether the patient is improving or deteriorating."



Kevin Collopy oversaw the development of education and protocol of care for severe sepsis patients. Collopy's service became the first EMS service to perform point-of-care serum lactate testing.

But spotting severe sepsis can be difficult. "Patients are diagnosed with severe sepsis when they meet the criteria for sepsis, but their blood pressure remains low after IV fluids, or if serum lactate levels are elevated above four," Collopy said. "The elevated lactate level is the piece that's often overlooked and that's where severe sepsis often gets missed. You have to have the technology to determine the elevated lactate, and it isn't available in some systems."

All of the hard work of putting the processes in place and attaining accreditation has paid off. In 2014, AirLink/VitaLink performed pre-hospital labs on 337 patients, which resulted in direct changes to patient care in 38% of the cases. These changes included upgraded bed status to ICU, changes in ventilator settings and electrolyte imbalance corrections. Most significantly of all, NHRMC's severe sepsis mortality rate in patients who've been transferred from other facilities has dropped precipitously.

"In the first year alone, we reduced mortality from 47% to 24%, and there were 16 additional patients who walked out of the hospital that may not have been able to otherwise,"

Collopy said. "In 2013, we dropped mortality to 14%. We are now below the national average with our transferred patients."

The smaller communities in the eight counties that AirLink/VitaLink serves have felt the impact most acutely.

"The majority of the area is rural with small critical access hospitals," Collopy said. "That's the reason we wanted to bring this technology to the hospitals. We can have one standard that our hospital can use rather than relying on the other hospitals to find the funding to diagnose these patients. We decided we were going to own the solution."

At the heart of the program's success is the proactive approach of diagnosing severe sepsis in the field and administering antibiotics on the scene, rather than wasting precious time in transport and delaying administration until after

hospital arrival. Many patients have improved enough not to need intensive care because of the improvement from first contact to the time the patient arrived at the hospital.

"It's better for the patient if we give the first antibiotics before arrival at NHRMC," Collopy said. "We know the biggest difference is made in the first hour of diagnosis, so we need to give the antibiotics as early as possible. We carry those antibiotics and administer them to the patient before they ever hit the doors of our hospital."

The standard protocol now is that by the time patients with severe sepsis arrive at NHRMC, they will have received a dose of vancomycin plus a second antibiotic; AirLink/VitaLink administers Zosyn if one wasn't given by the referral hospital.

Collopy reports that hospital reaction to all of this has been overwhelmingly positive. More severe sepsis patients are being identified and treated earlier, which leads to better outcomes. And it means that patients are receiving the right level of care at the right time because a diagnosis can be made sooner.

"Patients are now identified before they arrive because our team is empowered to call code sepsis activation," he said. "They are able to move the patient to the right bed the first time. The goal is to reduce the total amount of time spent in the ICU and the total amount of time they are in the hospital."

Collopy credits much of the success of this program to the leadership and foresight at NHRMC and AirLink/VitaLink.

"I'm fortunate to work for a hospital system that believes in the right thing for the patient, so cost isn't a barrier," he said.

For Collopy, improving patient care has been at the center of everything he has achieved in his medical career.

"I like to know that every day we've done something that's going to change how one of our providers treats their patients and ultimately improves the odds of that patient having a meaningful outcome," he said. "I want everyone treated like I would treat my family if they were in an emergency."

Emboldening Gatekeepers

Wayne Zygowicz's research paper creates the open dialogue about suicide EMS has needed

As a paramedic firefighter with more than 32 years of EMS experience, Wayne Zygowicz has dealt with a lot of things in his career. But it was an incident that happened at his Littleton, Colo., fire station that led him to look at life—and death—with a new perspective.



Wayne Zygowicz

In 2007, Littleton Fire and Rescue (LFR) responded to a call at the home of an elderly gentleman who'd been suffering from depression. He had tried to take his own life using carbon monoxide in his home. Paramedics resuscitated and treated the man, who was subsequently sent to a mental rehabilitation facility. Five months later, the man returned to a Littleton firehouse with a gun, but he found the station house empty because everyone was out on a call.

"He shot and killed himself on the front lawn of the firehouse, at the same time as a grade school was letting out down the street," said Zygowicz, who is division chief for LFR and sits on the editorial board of *JEMS*. "We don't know if it was a homicide attempt or a suicide." The event rattled everyone working at the fire station.

At the time, Zygowicz had been attending an Executive Fire Officer program, the equivalent of a four-year master's level program, at the National Fire Academy. The program required Zygowicz to write four thesis papers over four years.

"That significant event peaked my interest in suicide," he said. He decided to devote one of his thesis papers to investigating and writing about suicide, as it pertains to EMS.

"I started to think back to all the suicides that I've gone on over the years. I did some research through the CDC (Centers for Disease

"How could this have happened? ... How could we miss those subtle calls for help in our own brothers and sisters?"

Control and Prevention) and found out that Colorado was No. 6 in the nation for suicide," Zygowicz said. "In all of those years of responding to suicide-related calls, I had no idea that Colorado had such high rates of suicide, especially in this beautiful state that I live in."

Zygowicz investigated further and discovered gaps in the National Suicide Prevention plan issued by the surgeon general's office at the U.S. Department of Health and Human Services.

"The National Plan called for 'gatekeepers' in society, such as police, fire, clergy, and people who interact with the public on a daily basis, is to be trained in suicide prevention and education. Gatekeepers should be

trained to identify people who have mental health issues and may be at high risk for potential suicide," said Zygowicz. "In 30 years, I have never had any education on suicide prevention. I went to the closest textbook I had on paramedicine and found a page and a half on suicide. Yet the fire department was responding to these suicide calls with no education or training on how to handle them. That's what motivated me to write this paper."

In October 2014, the CDC released a report underscoring that the rate for the top 10 leading causes of death had all decreased—except suicide. The national suicide rate, the report said, rose 2% in 2012.

As Zygowicz was researching and writing his paper, he was met with some resistance in discussing the topic of suicide. "I interviewed a lot of people before I started this paper. I was told that it was not a topic I would want to write about because people don't want to talk about it. But the more people told me not to talk about it, the more I wanted to talk about it," he said. "It made me want to dig my heels in that much more and work to make a difference."

His widespread interviews revealed that many of the agencies and people involved in the awareness and prevention of suicide aren't necessarily working in a cohesive manner. "I found the national suicide effort is actually fractured," Zygowicz said. "Many are doing their own thing. Through the National Suicide Prevention strategy, we should all be working together and that's not happening."

After interviewing local and national firefighters and police officers, Zygowicz also found a lack of awareness about suicide prevention at every level. "There is a very big disconnect around what should be happening down at the field level for people



Wayne Zygowicz's research on suicide prevention has shined a light on the importance of education and training of EMS and fire personnel in treating mental health issues in colleagues and patients.

actually taking care of those who are attempting suicide and dealing with family members," he said.

Zygowicz talked with a seasoned Littleton paramedic captain, who told him, "Every time we have to respond to a suicide, every time we have to see the trauma and grief a family goes through, it puts a little nick, a little black mark on our soul." Zygowicz included the comment in his paper.

Once he completed the research paper, Zygowicz made it his mission to disseminate the information wherever, and to whomever, he could. The paper contains all of the research information, a training class on suicide for first responders, standard operating procedures for responding to suicidal crisis and resource brochures to leave at the scene. He hopes the information will be used to prevent inactivity by untrained first responders at suicide scenes. "I call it 'The Look,' where first responders stand around with their hands in their pockets not knowing what to say or do," Zygowicz said. "It's awkward because we haven't been educated in dealing with these situations."

other. Zygowicz offered his paper to the chief in hopes their firefighters might better understand this complex problem. "How could this have happened? How could we miss the signs in our brothers and sisters, who we work and live with 110 days a year, 24 hours a day?" Zygowicz said. "How could we miss those subtle calls for help in our own brothers and sisters?"

Part of the answer to those questions is the stigma mental health disorders still embody, especially in fields where perceptions of strength run deep. "If you're a firefighter and have a heart attack, your brothers and sisters rally around you," Zygowicz said. "But if you are identified as having a mental health issue or substance abuse issue, they don't embrace you. They mostly push away from you."

Zygowicz also highlights the lack of money to support mental health treatment as another obstacle in bringing awareness of suicide out from the shadows. "Mental health doesn't pay well. Denver has one of the highest rates of suicide in the country, and we have one of the lowest rates of paying for mental health treatment," he said.

Despite these obstacles, Zygowicz emphasizes that suicide is treatable, but prehospital providers must first recognize the signs in their patients—and their colleagues—and then take action.

"It's my mission to talk about a subject that no one wants to talk about that affects our firefighters on a weekly basis," he said. "We deal with a lot of suicides here in Colorado. Many of these folks could be treated for their depression and substance abuse and may never end up taking their own life. We have to start talking about this issue and try harder to stop these unnecessary and untimely deaths."

As an example, Zygowicz highlights actor Robin Williams' recent suicide. "He was a very talented man who had many things going for him. The idea that he could take his own life is almost beyond comprehension," he said. "I want to send out this paper, and get the word out to as many people as possible, to prevent these kinds of needless deaths. We could do so much more in this field."

He's presented his suicide training program across the country and did the presentation at the 2013 EMS Today Conference and Exposition. He found it ironic that he was scheduled last on the conference's list of presentations—Saturday afternoon. "I wasn't expecting to have a keynote presentation, but how many people are going to be around on the last day of the last session on a Saturday afternoon?" Zygowicz said.

He told the audio-visual person not to bother with the auditorium electronics, since he only expected a few people to show up. "I told them I wouldn't need a microphone because I'd just sit down and talk with the five or six people that would show up," he said. A few hundred people came to the presentation. "It shocked me," he said.

A neighboring Colorado fire department had two fellow firefighters commit suicide within a year of each

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