

EMS 10

INNOVATORS IN EMS
2012



EMS 10

INNOVATORS IN EMS
2012



Table of Contents

- 1 Innovation & Progress**
EMS 10 honorees paving the path for the future of EMS
By A.J. Heightman, MPA, EVIT-P
- 2 Changing Strategy**
Dale Becker, NREMT-P, formed & implemented a new crew resource management initiative for high-performance CPR
- 4 Signs of a Stroke**
John Curry, Jr., helped create the FOAM-D Stroke Consortium with a goal of providing comprehensive, rapid response to the treatment of stroke patients
- 6 College EMS**
Jessica DeMarzo EMT-B, founded the Purchase College Emergency Medical Service, a new collegiate EMS agency
- 8 Dealing with Frequent System Users**
James Dunford, MD, FACEP, has directed the implementation of the San Diego RAP and eRAP, an EMS-based surveillance & case management system
- 10 Enhancing Rural Patient Care**
David Grovdahl, EMT-P, revamped his EMS system using technology and improving educational standards
- 12 On the Move**
MedStar Mobile Healthcare blazes a trail to revolutionize how EMS agencies successfully transition to mobile healthcare agencies
- 14 Improving Cardiac Arrest Survival**
Graham Nichol, MD, MPH, FRCP(C), FACP, FAHA, led the creation of the Mission: Lifeline Cardiac Resuscitation Systems of Care program
- 16 Cooling Resuscitation**
Joseph Ornato, MD, FACP, FACC, FACEP, directed the launch of a cooling program that allows for the discharge of more than 14% of cardiac arrest patients neurologically intact from the hospital
- 18 Expanding EMS Experience**
David Page, MS, NREMT-P, spearheaded the formation of the Saint Paul Emergency Medical Services academy with the goal of diversifying St. Paul's EMS workforce
- 20 Bystander CPR**
Richard Price launched the PulsePoint smartphone mobile app to improve cardiac arrest survival rates

Innovators in EMS 2012

Vice President/Publisher
Jeff Berend

Editor-in-Chief
A.J. Heightman

Supplement Author
Cynthia Kincaid

Supplement Editor
Kindra Sclar

Designer/Illustrator
Kermit Mulkins

Advertising Director
Judi Leidiger

EMS 10: Innovators in EMS 2012 is a supplement sponsored by Physio-Control Inc. and published by PennWell Corporation, 1421 S. Sheridan Road, Tulsa, OK 74112; 918/835-3161. **Copyright © 2013 PennWell Corporation.** No material may be reproduced or uploaded on computer network services without the expressed permission of the publisher. Subscription information: To subscribe to a PennWell Public Safety publication, visit www.jems.com. **Advertising information:** Rates are available on request. Contact JEMS Advertising Department, 4180 La Jolla Village Drive, Ste. 260, La Jolla, CA 92037; 800/266-5367.

Cynthia Kincaid is an award-winning writer who has written numerous articles for medical and healthcare publications and organizations. She was the recipient of a 2007 Excellence in Journalism award for the Society of Professional Journalists. Kincaid holds a bachelor's degree in journalism and a master's degree in public administration. Contact her via e-mail at cynthia@cynthiakincaid.com. The author has reported no relationship with the sponsor of this supplement.



Innovation & Progress

EMS 10 honorees paving the path for the future of EMS

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

This is the fifth 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 nominees on their hard work, dedication and selfless efforts in 2012 and selected the individuals or agencies they felt exhibited 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 that you feel could make a difference for patients, EMS systems or your prehospital colleagues.

Dale Becker, NREMT-P – Recognized for forming and implementing a new crew resource management initiative for high-performance CPR in Maryland.

John Curry, Jr. – Recognized for helping create the FOAM-D Stroke Consortium, a network composed of South Florida firefighters, doctors from the Herbert Wertheim College of Medicine and 16 local hospitals.

Jessica DeMarzo, EMT-B – Recognized for founding the Purchase College Emergency Medical Service in New York.

James Dunford, MD, FACEP – Recognized for directing the implementation of the San Diego Resource Access Program (RAP) and electronic Resource Access Program (eRAP).

David Grovdahl, EMT-P – Recognized for aggressively revamping the EMS system to improve service and patient care using technology and improving educational standards in a rural Oklahoma region.

MedStar Mobile Healthcare – Recognized for blazing a trail to revolutionize how EMS agencies can successfully transition to mobile healthcare agencies.

Graham Nichol, MD, MPH, FRCP(C), FACP, FAHA – Recognized for leading the creation of the Mission: Lifeline Cardiac Resuscitation Systems of Care program.

Joseph P. Ornato, MD, FACP, FACC, FACEP – Recognized for directing the launch of a cooling program that allows for the increased discharge of aggressively cooled out-of-hospital cardiac arrest patients neurologically intact.

David Page, MS, NREMT-P – Recognized for spearheading the formation of the Saint Paul Emergency Medical Services academy in Minnesota.

Richard Price – Recognized for launching the PulsePoint smartphone mobile application and supporting Foundation.

From left to right: Richard Price, Dr. Jeff Beeson (MedStar), Rob Lawrence (accepting on behalf of Dr. Joseph Ornato), David Page, Dr. Graham Nichol

(front row) Dr. James Dunford, David Grovdahl, Dale Becker & Matt Zavadsky (MedStar)

(not pictured) John Curry, Jr., Jessica DeMarzo, Dr. Joseph Ornato



A.J. Heightman, MPA, EMT-P, is editor-in-chief of JEMS. Contact him via e-mail at aheightman@pennwell.com.

Changing Strategy

Dale Becker formed & implemented a new crew resource management initiative for high-performance CPR

You could say that Dale Becker, NREMT-P, thinks a lot about light bulbs. The reason for this makes sense, when the captain of the Howard County (Md.) Department of Fire and Rescue Services puts it into context.

On Dec. 29, 1972, 101 people were killed when Eastern Air Lines Flight 401 crashed in the Florida Everglades. The flight crew was about to



Dale Becker

execute its routine night landing when they noticed the landing gear indicator light didn't come on after they deployed the wheels. The crew became so preoccupied with what they thought was a malfunction in the landing gear that they failed to recognize that autopilot had been inadvertently disengaged. The plane lost altitude and crashed. It turned out that the landing gear deployed just fine; the indicator light bulb had simply burned out. At the time, Flight 401 was the second deadliest single aircraft disaster in the U.S.

Becker thinks this tragic accident holds valuable lessons for EMS, particularly concerning patient care, CPR and cardiac arrest. So he has set out to make changes that will prevent EMTs from becoming distracted by their own burned out light bulbs.

Individual Assignments

It started in March 2010, when Becker was invited to Seattle's Resuscitation Academy to learn why the city has had such successful cardiac arrest survival rates. He saw how their EMTs, paramedics and firefighters worked together, each executing a specific field assignment instead of arriving at a scene and being told what to do. "At the end of the week, we were asked what we were going to do to make a difference in our community," says Becker. "I took on the responsibility of changing our culture and how we managed our cardiac arrests in the field."

When he got home, Becker shared what he had learned with his EMS supervisor and captain. "I told him we could learn together. We'll talk about it, and tweak it and we'll put our fingerprints all over it," Becker says. "We trained with a manikin, AEDs, monitors and stopwatches. We took notes. The medical director came out one day and saw what we were doing and gave us continued support and approval."

Then they were ready for field-testing. When a firefighting crew arrives on scene, every member must know what to do; each has a specific assignment they are responsible for. "Everybody knows their role," says Becker. "We've never done this before with EMS."

The agency made riding assignments for EMTs responding to cardiac arrest calls so providers would know their responsibilities prior to reaching

the scene. "I've been a paramedic for more than 20 years now," Becker says. "You walk into a room and everyone looks at you. Then you have to move all the pieces of the puzzle around while you are intubating, doing drug calculations and monitoring EKG changes. It's a lot, and you get distracted." Having the crew assigned to pre-set responsibilities saved a lot of time and reduced confusion. Taking these steps allowed Becker and his crew to stop being fixated on the burned out light bulbs and hone in on the problem and solution. He notes that it was "shockingly simple."

"It's worked faster than I thought it would," Becker says. "We still have a long way to go in Howard County, but it's catching on." Under the new criteria, the EMTs were able to resuscitate the first five cardiac arrests they worked on—every one of them. "The comments from the crew, veterans from three to more than 20 years, were that they have never had cardiac arrests that ran so smoothly," Becker says. "They were calm, quiet, well organized, and things got done very quickly. It was amazing to them. They said we should have been doing this all along."

Overcoming Concerns

Becker recognizes the controversy surrounding these new procedures, namely the argument that agencies need more

paramedics. That is certainly true of some woefully understaffed services, but Becker argues that many agencies already have the personnel they need, they just need to deploy people in a better, more effective manner. "We need existing paramedics to do what they should be doing and that's taking care of critically ill patients," he says. "We need to measure patient outcome. We measure how fast we can get out on the street, how fast we can

"We were asked what we were going to do to make a difference. I took on the responsibility of changing our culture and how we managed our cardiac arrests."

get a unit to the street, and that's well and good, but what's the outcome in the end?"

Becker wants EMTs to stay focused on administering CPR and doing effective chest compressions, not worrying about what role they should play when they first walk through the door or wondering who should execute what procedure. "We are spending way too much time with our hands off the chest. Our goal now is, 95% of the time, while the patient is in cardiac arrest, we expect you will do CPR," he says. "If we get distracted by our burnt out light bulb, and effective chest compressions aren't done, and done continuously, then patients aren't going to survive."

He adds, "We have marginalized the EMT's role and their responsibility as part of the team. My goal in Howard County is to get back to a time when paramedics used to work around the EMTs. But that culture has changed. Now EMTs often hesitate to act until paramedics give them directions."

Becker now tells his EMTs to do what they have been trained to do and not to stop unless he tells them to. "That's the approach we have taken with the cardiac arrests," he says. "EMTs know under no circumstances do they stop chest compressions." He admits they are still working on getting the bugs worked out and getting the culture changed, but he has seen the changes and is quite hopeful for the future.

Making Change

One of the most significant ways Becker was able to affect change in the culture was by actually measuring, with a stopwatch, the time EMTs were administering chest compressions on a manikin. EMTs were measured over 20 minute intervals and then asked how long they thought they had done the actual chest compression. "Most of them thought 80–90%. The reality was everyone did compressions less than 50% of the time," Becker says. "Those results were stunning."

"It's about looking at ourselves in



One of the most significant ways Becker was able to affect change in the culture was by actually measuring, with a stopwatch, the time EMTs were administering chest compressions on a manikin.

the mirror, seeing what we are doing and not being afraid of what we see," Becker says. "If we don't, we're never going to make things better, and we're never going to change anything. We'll just keep doing it the same way."

In the simplest terms, Becker and his agency are being highly intentional about focusing on cardiac arrests and giving the highest feasible quality of care in the shortest possible amount of time. "My crews know that I expect them to resuscitate every patient we run with a cardiac arrest. Nothing else is acceptable," he says. "I also understand that it's not going to be possible or happen all the time. But I want to put it in our minds that we are not going to be defeated before we run the call."

In the two-and-a-half years since Becker has instituted these protocols, he says he has lost count of how many patients have survived cardiac arrest and walked out of the hospital. Before they were put in place, he could count only three survivals that he was involved in during his almost two decades as a paramedic. "If we don't give the hospitals anything to work with, then they can't make it any better," he says. "It's up to us to deliver the patient in the best possible condition."

Saving Lives

Becker believes that EMTs, paramedics and the new protocols really can make a difference in people's lives, but the thing that drives him is making their jobs easier, while saving as many people as possible. "Our patients are dying because we are distracted by our burnt out light bulbs," he says. "Everyone is paying attention to the paramedic intubating, or what the monitor says, or worrying about getting the drugs out, or moving the furniture. We're not paying attention to doing CPR." Focusing on that, Becker knows, will save lives.

So if you should see Dale Becker staring at a burned out light bulb, just know that he is probably contemplating new ways to give cardiac arrest patients a second chance at life.

Signs of a Stroke

John Curry, Jr., helped create the FOAM-D Stroke Consortium with a goal of providing comprehensive, rapid response to the treatment of stroke patients

The day John Curry, Jr.'s mother had a stroke changed his life forever. The 29-year EMS veteran called on all the colleagues he knew to help get his mother the immediate treatment she needed to address her ischemic stroke. She made it to the hospital with just five minutes to spare—five minutes that ultimately saved her life and returned her to normal function.



John Curry, Jr.

Although the EMS coordinator for Coral Gables (Fla.) Fire Rescue Department was grateful to his colleagues for saving his mother's life, the episode left him unsettled and looking to do more for stroke victims. "I made a promise to my mother that if she recovered, I would fix the way we treat strokes," he says.

A Better Way

The incident also left him wondering how other people affected by stroke, people who did not have a direct chan-

nel to the EMS community, would fare in the situation in which he found himself. "All the people I know in EMS, and my mother made it by just five minutes," he says. "If this is me, engaging all the people I know, what does the normal person get? We can do better than this."

That better way turned out to involve the Fire Officers Association of Miami-Dade Consortium (FOAM-D), of which Curry is the EMS committee chair. At the time of his mother's stroke in 2005, the consortium, comprised of six jurisdictions, had languished. That all changed when Curry told the committee he wanted to focus on strokes. Specifically, he wanted to do something deemed radical at the time: Send primary stroke patients to primary centers and send big stroke patients to comprehensive stroke centers, even if it meant bypassing primary centers. The committee threw all of its support behind Curry and his stroke initiative.

"We thought people would be better served if they were having a large stroke or bleed at a comprehensive center," he says. "And we set out to accurately define that in the field. We wanted to determine who went where."

Developing a Strategy

The committee developed a unique, two-page checklist, called the Cincinnati Stroke Scale, which is being modified for the National Institutes of Health (NIH) simplified stroke scale. "The first page tells if someone is having a stroke, and the second page tells how big of a stroke and the destination criteria," he says.

Once the checklist was finalized, the real battle involved defining destination criteria. "Anytime you mention that you are going to bypass a primary stroke center, and transport to a comprehensive stroke center, that's political and can cost hospitals money, especially if you don't do a good job in the field," Curry says.

So instead of engaging in the usual political conflicts, Curry created an ad hoc committee of FOAM-D, composed of members of his committee

and the interventional neurologists from the seven surrounding hospitals. He called an initial meeting with the surgeons to tell them about the idea of the destination criteria and to get their feedback—and buy-in—to FOAM-D's proposed criteria. Without their support, the initiative would founder and probably fail.

Curry wanted to make sure the committee avoided getting slowed down with too many voices. "I didn't want to have a lot of people, and the heavy hitters, the cream of the crop, are the interventional neurologists," he said. So Curry decided to talk to the interventional neurologists for their opinions and feedback. "I went right to the top. My focus was on how we call out comprehensive strokes."

When he first met with the surgeons, Curry thought they would "chew him up." Instead they greeted him with open arms. "They told me, 'We have been waiting for a guy like you to come along and push this agenda,'" he says. "Our administration would never do it without the push from EMS." Part of the initial success of the coordination of the group was the realization of the power that EMS holds with the transportation of patients. "Eighty-five percent of a hospital's stroke intakes come from fire/rescue," Curry points out.

The surgeons helped develop pre-hospital and out-of-hospital criteria. With that in place, the committee drew up airtight contracts with the hospitals. "It was well thought out by everyone," Curry says. "[The contracts] include inter-hospital transfers and how to track and report data points."

Cultivating the Program

All the work has resulted in a first-of-its-kind network, the only one in the nation that bypasses primary stroke centers and goes to comprehensive

stroke centers based on EMS and hospital stroke criteria. “When we call from the field, the hospital has to activate,” says Curry. “When we pass through the emergency room, the patient has to be seen by a neurologist within 15 minutes. If it’s an ischemic stroke at a primary, they have to push the tPA within an hour, 90% of the time.”

Curry adds, “The hospitals voluntarily sign into the network. We track compliance, and if the hospitals don’t comply they are considered out of network.” If there are issues, the problems are worked out with the hospital CEO, and corrective action plans are drawn up and put into place.

The stroke initiative has had what Curry calls “growing pains,” but has, nonetheless, been successful. The concept is now being adopted by Palm Beach (Fla.) EMS, and Curry hopes that one day it will migrate across the nation, particularly given the prevalence of stroke. “There are roughly 4,000 critical strokes a year in our area alone,” Curry says. “Eighty-five percent of those are small strokes that can go to a primary stroke center. But 15% need to go to a comprehensive stroke center.”

He adds, “We wage these battles here to beta test, to prove that the theory does work. We do it so other communities, with only a couple of hospitals, can have the tools to definitively diagnose someone who has a one-in-a-million shot of surviving and take them to the correct facility.”

Funding for the stroke initiative comes from the hospitals. In addition, the committee wrote a grant to secure the money to hire a data manager. Currently, the data is being collected on a server, and the manager will begin extrapolating the numbers and report the impact of the program. That report is being compiled now and results are expected over the next few months.

After developing the strategy of defining destination criteria for



Part of the initial success of the coordination of the group was the realization of the power that EMS holds with the transportation of patients.

strokes and creating the system in his community for transporting stroke victims to either primary or comprehensive stroke centers, Curry and his FOAM-D committee are now working on Phase II of the program. This involves training eighth-graders how to spot the warning signs of a stroke, particularly in their parents and grandparents. It’s an ambitious undertaking but the kind of challenge that John Curry seems to be attracted to.

“We are looking at it as a kind of train-the-trainer program where we will teach eighth-graders about the signs and symptoms of stroke, and then they can go back and teach their parents and grandparents what to watch out for,” Curry says. “Eighth-graders are easy to train; they are enthusiastic, and they care about their grandparents.”

Additionally, FOAM-D is running public service announcements on TV and is planning to create and pass out literature and refrigerator magnets on the signs and symptoms of stroke for the general public to have in their homes.

The Right Thing

What lies at the heart of this entire stroke initiative, and indeed all the work John Curry has done over his lengthy EMS career, is a desire to do the right thing. He sees himself as the guy who says, “Why can’t we do this? Why can’t we do that?” It’s a philosophy that has no doubt rubbed some

the wrong way, but it’s also a philosophy that has absolutely saved many lives.

“If a doctor says to me, ‘You don’t know what you’re talking about,’ I go to some-

one else,” Curry says. “I want to do the right thing because it’s important to me. I want to see people live a healthy life.”

That doesn’t mean that he didn’t have his doubts, especially early on, about just what the right thing really meant. Then he met a man in trouble out on an emergency call and tried to save his life. Despite Curry’s efforts, the man died. Curry shared his doubts with a physician about working so hard on someone who died anyway. The doctor told him, “Your job is to give these people a one-in-a-million chance to survive, and that’s what you did. So hold your head high.”

Curry has done so ever since. He has spent his career pushing the barriers, considering the alternatives, and asking why or why not. And his mother couldn’t be prouder of him.

“We wage these battles here to beta test, to prove that the theory does work. We do it so other communities can have the tools to definitively diagnose someone.”

College EMS

Jessica DeMarzo founded the Purchase College Emergency Medical Service, a new collegiate EMS agency

Most typical college students spend their time studying, completing schoolwork, worrying about majors, and maybe trying to squeeze in a social life between exams. But 19-year-old Jessica DeMarzo, EMT-B, is anything but typical, and those things only satisfied part of her; she found herself wanting to do more.



Jessica DeMarzo

For most, this kind of initiative would seem extraordinary, let alone embarking on such an ambitious undertaking in the first semester of college. But for those who know DeMarzo, this kind of drive and determination is just part of her DNA.

While in her senior year of high school, when most were concentrating on applications to colleges and the senior prom, DeMarzo was busy getting her EMT certification. Being exposed to an EMS environment through her job at the Northvale Ambulance Corp. in Northvale, N.J., and seeing how an ambulance agency runs, gave her the impetus to start a similar program when she got to college. When one of her friends became gravely ill, she knew the time had come to develop such a program.

"I witnessed a few medical emergencies on campus my freshman year, and because the transport agency covers such a large area of the state,

they can take up to a half-hour to get to campus," she says. "One of the medical emergencies I first witnessed on campus involved one of my friends, and I remember waiting for 20 minutes for the ambulance. It lit a fire under me to start an EMS service on campus more quickly than I was expecting to."

Purchase College draws 4,000 students a year from around the world to participate in its liberal arts and sciences programs, which are taught by 300 faculty members. The school boasts an environment where students can "develop their talents, expand their minds, and prepare for a life of creative independence." In short, it seemed to DeMarzo to be a perfect place to introduce a new EMS concept in the form of an on-campus EMS agency.

So in the fall of 2011, the first semester of her college career, the Purchase College, State University of New York undergraduate decided to start a collegiate EMS program on campus.

Finding Inspiration

"It was one of the first things I wanted to do when I got to college," DeMarzo says. "I wanted to find an EMS program and, if they didn't have one, then I wanted to make one." When she found out the school didn't have such a program, she set about putting one in place.

"I'd like to educate the campus about emergency situations and make sure everyone is prepared, even if it means just being on hand for medical emergencies."

Taking Initiative

Starting a collegiate program from scratch can be daunting, so DeMarzo opted to piggyback on existing resources. "My idea was to supplement the system already in place and provide more immediate care on campus," she says.

DeMarzo knew that developing such a program, and making it effective, would take permission from a variety of agencies willing to work together toward a common goal. Although such a commitment sounds noble, getting everyone to agree on, and support, such an initiative can be challenging, to say the least. But DeMarzo was unfazed by the challenge.

"I contacted a few people on my campus to see who could help me go about doing it," she says. Those "few" people included university police, college administrators, student health services, the Purchase College Council, Harrison EMS and the Albany office of the State University of New York. She also spoke to her college advisor and several student friends as added support.

"It was difficult at first to track people down and see who could help with the creation of this," she says. "A lot of people said yes, it was a great idea, but they didn't know what their role would be, and they weren't sure how they could help." DeMarzo didn't give up. She pulled in advisor Justin Herminhouse and fellow student Teddy O'Rourke, and the three joined forces. "We joined together and started speaking out to people who could help," she says. "Everyone was very receptive and really pushed for this to happen."

A year and a half after DeMarzo had the idea, the Purchase College Emergency Medical Services program

launched in the fall of 2012. The newly minted EMS service started responding to calls in early 2013. Currently, the small group of responders is working with Harris EMS, as Purchase has worked out a partnership agreement with this local EMS service.

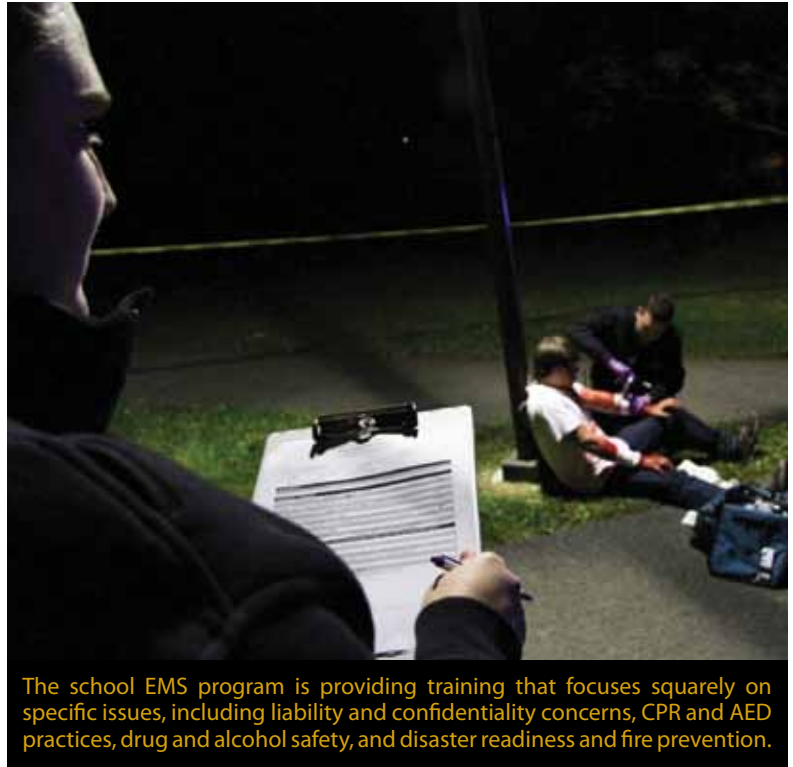
Looking to Grow

But DeMarzo's vision for the fledgling medical service goes far beyond responding to a few campus medical emergencies, using a handful of students. "Personally, I'm hoping to not just respond to medical emergencies on campus, but to also inform and train more students," DeMarzo says. "I'd also like to educate the campus about emergency situations and make sure everyone is more prepared for them, even if it means just being on hand for the medical emergencies, if needed."

The Purchase College EMS program is currently being funded through the campus student government and has a budget of \$6,000, which DeMarzo finds generous but would still like to see expanded. To meet her goal of developing, coordinating, improving and maintaining a comprehensive and dynamic collegiate EMS system on campus, one that will help reduce premature death, disability and injury while training more students to participate, the program will need to grow, and that will take more money.

"Everyone is very behind us, and we've gotten a lot of support. We've gotten a lot of equipment," she says. "Right now we are walking to the scene because we don't have a vehicle. While we have the yearly budget that we requested, we will need funding for additional equipment and supplies." She is hoping to get the budget bumped up in the future to get more people trained, bring more people in to talk to students, and to expand the service more toward the campus in general.

It's the training aspect of the program that has DeMarzo's greatest attention right now. She and her team are developing new standards around



The school EMS program is providing training that focuses squarely on specific issues, including liability and confidentiality concerns, CPR and AED practices, drug and alcohol safety, and disaster readiness and fire prevention.

the medical care they offer, and having members trained properly is of utmost concern. "We are not only training our responding members, but we are hoping to train all the paraprofessionals, students, staff, and resident assistants, as well as service and club heads," DeMarzo says. "We want to train anyone who has a role in helping students out day-to-day or in emergencies."

To achieve this goal, the school EMS program is providing training that focuses squarely on specific issues, including liability and confidentiality concerns, CPR and AED practices, drug and alcohol safety, prehospital care, disaster readiness and fire prevention. The emergency medical practice training is open to all students and faculty on campus. In the near future, DeMarzo and others in the program will be certified to teach and certify others in CPR, AED and first aid. Those who become certified will then be able to train others.

Building on Success

DeMarzo wants to be clear that she founded the Purchase College EMS program not because the existing EMS services were substandard. Rather, the services were effective but stretched too thin. Her idea is to build on an already solid structure, one that can enhance emergency medical care to college students and faculty at the school.

"While the system in place is effective, I felt like it could be so much more effective if we had another step put into it," she says.

DeMarzo expects to graduate from Purchase in 2015, when she will pursue paramedic certification. Where she will do that, and where she will end up, is anyone's guess. What won't be surprising are the drive, competence and intelligence that DeMarzo's employer will find once they hire her.

"I love what I do, and from the moment I started riding on an ambulance and helping people, I knew it was something I would never get tired of," she says. "Just knowing that on people's worst days, I can try to make it a little better, is one of the main reasons I do what I do."

Dealing with Frequent System Users

James Dunford has directed the implementation of the San Diego RAP and eRAP, an EMS-based surveillance & case management system

According to the National Emergency Number Association, an estimated 240 million calls are made to 9-1-1 in the U.S. each year, and the medics in San Diego know these numbers all too well. Under the leadership of James Dunford, MD, FACEP, the San Diego Fire-Rescue Department and Rural/Metro Ambulance decided it was time to address the issue of “frequent flyers.”



James Dunford, MD

Identifying the Problem

The result is the implementation of the San Diego Resource Access Program (RAP) and the electronic Resource Access Program (eRAP), an EMS-based surveillance technology and case management system. RAP is designed to help people find appropriate avenues of care other than calling 9-1-1 to be transported to the emergency department. The system uses advanced health

information technology (HIT) to track, prioritize and even alert case managers of individuals in real-time.

“Every city in America has this problem; there is no urban community that doesn’t have this problem,” says Dunford, San Diego’s EMS medical director and professor emeritus of emergency medicine at the UC San Diego School of Medicine. “We have identified at least 1,000 people who call an ambulance six or more times a year. We had 130 people who called more than 20 times last year, generating more than 2,000 transports.”

The eRAP system harnesses the resources of a federal Beacon Community Health Information Exchange grant, as well as the expertise of San Diego-based First Watch and InfoTech Systems Management. The

system was able to pinpoint one patient who called 9-1-1 96 times over a three-month period. “This man wasn’t on anyone’s radar because he was all over the city,”

Dunford says. “Any one of our 30 ambulances probably transported him four times; that would have turned into 120 transports without the tools to finally spot the problem. These callers will show up everywhere in the city, but aren’t enough of a thorn in anyone’s side to be flagged. eRAP has the ability to analyze the entire system minute-by-minute.”

The eRAP system also allows EMS to map where frequent callers are encountered and identify hotspots impacting the 9-1-1 system. The system examines current and past EMS medical records with “vulnerability filters,” searching for terms that reflect such issues as substance abuse, psychiatric/behavioral emergencies and unaddressed in-home social needs. “As a part of a Centers for Medicare and Medicaid Innovation (CMMI) grant, we are helping one medical group to identify and case manage 200

dual eligible beneficiaries to reduce their rates of readmission,” says Dunford. “The RAP program concentrates on bringing resources to individuals and communities. We can hotspot communities by ZIP code to identify vulnerable individuals and potentially link them to valuable programs.”

Dunford believes EMS systems are ideally suited for this role because they are on the front lines. “We know who is in trouble,” he says. “We are trying to leverage our omnipresence, if you will, to identify and prioritize ‘vulnerability.’ When people call 9-1-1 a lot, their conditions are very symptomatic and that’s a bad sign.”

Dunford says the system also recently used hot spotting techniques to identify communities where cardiac arrest victims were rarely receiving bystander CPR, then overlaid them with census track data. “These are communities that are clearly not being reached by current training methods,” he says. “We have begun to target these neighborhoods with the American Heart Association and others to provide more contextual training. It’s a more focused approach

to an important public health intervention.”

The program currently works with a coordinator who is an experienced paramedic. She is equipped with novel software on an

iPad that notifies her whenever one of her pre-identified clients is in the system. She also works with clients in the field, sometimes in coordination with the San Diego Police Department’s Homeless Outreach Team (HOT).

“The RAP coordinator will attach to the HOT team, which consists of a police officer, a psychiatric emergency response team specialist and an eligibility worker,” Dunford says. “With this complement of resources

“We are helping one medical group to identify and case manage 200 dual eligible beneficiaries to reduce their rates of readmission.”

she can target the most high-need homeless individuals to link them to resources and move them out of the 9-1-1 system.”

Changing the Impact

A recent study published in *Prehospital Emergency Care* on 51 clients indicated that the program works, reducing transports, hours of service for engines and ambulances and charges. Because the system continually mines more than 100,000 EMS run records per year, eRAP can identify the most frequent callers by week, month or even year, providing a measure of chronicity. The system also tracks why any individual repeatedly calls. For example, it lists the individual’s most frequent chief complaints, such as psychiatric, ETOH, shortness of breath or diabetes.

“We can stratify the EMS high-user community by need, including the homeless,” says Dunford. “The eRAP system helps us target the most difficult people with particular conditions and begin to link them with the resources they need. We are health navigators, not case managers.”

What’s more, the system tracks dollars and cents, aggregating the fixed costs of sending fire engines and ambulances to various areas of the city. “This is not the doctor or ambulance bill, but instead what it actually costs per hour to have a fire engine and ambulance respond,” Dunford says.

Two-and-a-half years ago, San Diego was awarded more than \$16 million as one of 16 U.S. “beacon communities” poised to demonstrate the value of electronically exchanging health information. “San Diego wanted to show the value of exchange of health information between hospitals and EMS, as well,” says Dunford. “The system we are building is meant to inform hospitals of what is happening before the patient arrives, and to take advantage of this new technology.”

More than just a piece of sophisticated technology, Dunford believes the eRAP program is a new instru-



RAP is designed to help people find appropriate avenues of care other than calling 9-1-1 to be transported to the emergency department. The system uses advanced health information technology.

ment to put on the dashboard of public health, one that can more accurately track chronic disease and assist in its management. “We feel it provides an opportunity to alert case managers and doctors before the person goes to the emergency room,” he says. “For chronic conditions, it would be very beneficial to be able to contact the patient’s case manager before the decision is made to take him to the emergency department.”

The eRAP system will also notify the patient’s care team by the time he or she arrives in the emergency department, facilitating direct communication with the treating doctor—and possibly avoiding an unnecessary admission. Quickly bringing the emergency room doctor into the care team provides the ability to efficiently determine the best treatment plan.

Common Good

Dunford has hopes of quickly expanding the system regionally and nationally. “As the health information system grows, and as this technology can be replicated in other parts of the region, we can show that we can do the whole thing on far larger scale,” he says.

The initial development and launch of the system has taken many people working together to bring the idea to fruition. Still, it has been the vision and drive of James Dunford that has put RAP on the map. In 1997 he saw the problem of people using 9-1-1 and emergency departments inappropriately—as so many do—and made it his personal mission to do something about it.

“As the city EMS medical director, and an emergency physician end-user, I felt that if I didn’t do something about the problem, who would?” he says. “This is in my wheel house of responsibility. I’m pretty passionate about the importance of lowering healthcare costs and improving the value of the care we deliver. I feel this is an important new role for EMS.”

That passion, says Dunford, begins with understanding where disease starts and how to effectively address it, particularly in more vulnerable populations. “You need to understand the ecosystem from which people come,” he says. “We have to focus first on those people if we are going to do anything about reforming the quality and value of healthcare care in this country.”

Dunford’s passion and vision also come from a place of deep personal caring and a belief that if given the right tools, people can—and will—work together toward common objectives. “Believe it or not, when I was in sixth grade, my hero was Dag Hammarskjöld, then secretary-general of the United Nations,” says Dunford. “I believe in the power of people working together. And I’m excited to be in a place right now where I can try to make a difference and do something for the common good.”

Enhancing Rural Patient Care

David Grovdahl revamped his EMS system using technology and improving educational standards

They say that good things come in small packages, and no one knows this better than David Grovdahl, EMT-P, executive director of Leflore County (Okla.) EMS. Grovdahl oversees a predominately rural county made up of 12 different communities in Oklahoma, one that is surrounded by 1.1 million acres of national forest. The largest town has a population of only 9,000 people, and the entire county population totals 50,000.



David Grovdahl

Grovdahl, a 16-year veteran and transplant from Texas and Wyoming EMS systems, has spent much of his career in rural EMS and has developed a deep and abiding love for the specialized medicine and patient response that rural EMS requires. So when he was invited to take over Leflore County, he jumped at the chance. Grovdahl soon realized that he needed to take the EMS system from a BLS to an ALS level. Beginning last year, he decided to aggressively revamp the EMS sys-

tem to improve service and patient care using technology and improving educational standards in “super rural” Oklahoma region.

Across the Map

Not surprisingly, Leflore paramedics can find themselves driving anywhere from 30 minutes to two hours just to get to a patient. Recognizing that his team had many challenges to face when it came to patient care, Grovdahl decided to update the system. “We saw a tremendous amount of potential to advance what EMS was doing here,” he says. “Just because we are a rural system doesn’t mean that we are on a secondary or tertiary level compared to bigger systems. We decided very early on that challenges in a rural environment were not going to hinder us from doing the same things as larger cities.”

So Grovdahl took his small but mighty team of 30 and got to work. He started with data collection. “In this day and age, with the access to technology, it’s not impossible to compete, we just have to be the ones that go seek it out,” he says. “When I was in Texas, we were big about using data that we got from the PCR system. And I have learned from my urban brothers and sisters that data is very important, so we brought in electronic PCR.”

Updated Technology

Grovdahl understood that some in Leflore County still didn’t have broadband Internet, so he partnered with Verizon to help ensure his rural area had clear 3G and 4G connections. “The southern part of our county is mountainous so there are challenges with mobile data and air

cards. It presented a unique challenge for us, but it wasn’t insurmountable,” he says. Grovdahl worked with Verizon to develop a workable plan to provide the technology needed for a modern EMS system to function. “I gave them our vision, and Verizon made it possible,” he says.

Once Leflore had the ability to connect throughout the county, Grovdahl installed ZOLL’s RescueNet Software Suite to track data. “We are tracking everything from how long it takes us to transport a patient, the outcomes and interventions that make outcomes positive,” he says. He took the data to surrounding hospitals and pointed out what Leflore EMS was doing and how they could all work better together. He told the hospitals that if his paramedics could start doing more treatment and intervention in the field, then patient outcomes could improve—and it worked.

“We were able to take a lot of the advanced technologies that EMS is using at WakeMed or Austin, or L.A., the bigger cities around the country,” says Grovdahl. “We are doing things like continuous positive airway pressure (CPAP) and bi-level positive airway pressure (BIPAP), sepsis alerts and st-elevation myocardial infarctions (STEMI) and correcting them in the field.”

It’s these kinds of partnerships that have made it possible to level the playing field for a smaller EMS system like Leflore County. “We looked at what they were doing in the urban areas,” says Grovdahl. “They have the resources and capabilities and financial availability to do things, and I have a staff of 30 without that infrastructure. So we looked at what they were doing and knew we had to take away and use things from their community paramedic programs.”

“We decided very early on that challenges in a rural environment were not going to hinder us from doing the same things as larger cities.”

Small-Town Connections

One advantage Grovdahl has is the small-town medical connections and familiarity that is missing in many large urban areas, and he uses that advantage for all its worth. “I have six family practice doctors in the entire county, so access to these doctors and communication lines are very simple,” he says. “I know these people. They call me up and tell me about [patients and situations] they have, and we put that in our system to track and follow. We send our crews out to visit these patients, or in the more extreme cases I go out to visit them myself, and we figure out what their needs are.”

The system also tracks “frequent flyers” and alerts Grovdahl and his team. “If someone calls three or more times in a 10-day period, then the system tells me I need to go and see what’s up with the patient,” he says. “So I go out and visit the person and figure out what they need.”

He cites one example of a man who called EMS every three days and racked up a bill of \$16,000. Although he had medical problems, he also had alcohol, family and social issues. “So from this one instance, we got into partnership with our adult protective group and our health department and started having roundtable discussions,” Grovdahl says. “As we started talking about client lists, we discovered we were all talking about the same people and decided to combine resources. EMS is the safety net of the healthcare system. By working together with other agencies, we have made huge strides in helping all of our community.”

As a group they were able to get the resources to the man calling 9-1-1 frequently, and he stopped calling. “We started fixing things, and he stopped calling because his quality of life got better. He’s not a burden to me or the hospital or social services,” Grovdahl says. “We had to invest more up front, but in the long-run we have saved thousands and thousands of dollars for everybody. Most importantly, we gave him his dignity back.”



David Grovdahl, center, accepts his EMS 10 award from his 10-year-old daughter, Rebecca, *JEMS* Editor-in-Chief A.J. Heightman, far left, and Physio-Control Inc. President Brian Webster.

Sharing Resources

Grovdahl believes that sometimes a little money invested up front can pay big dividends in the end. And getting the roundtable group together has made all the difference in using limited resources wisely. “We have learned to take some of these big programs in these big organizations and scale them down to what we can do,” he says. “We are seeing the same level of success. If we all work together, we can resolve things.”

These types of partnerships have continued. LeFlore has partnered with the local hospitals and anesthesiologists to learn about additional technology sharing and training programs. The agency is also working with university physicians to get additional training and advice on patient care. “Why reinvent the wheel? We are taking the best of what everybody is doing and applying it to our situation,” Grovdahl says.

In four years, LeFlore EMS has had no failed intubations or dislodged tubes. “We have performed over 300 intubations in the field with and without RSII, which is significant,” Grovdahl says. “High-fidelity healthcare is possible in rural Oklahoma and rural United States.”

But it’s not all take and no give. The small but powerful agency is more than willing to share what they know and have learned, taking their knowledge and pushing it out to others when they can. “If we know something is working well for us, we want everybody to know about it; nothing we do is proprietary,” says Grovdahl. “We take the best of everything, apply it and share it. This is the only way EMS overall is going to get better.”

The group also takes its own education to heart. Many of Grovdahl’s paramedics are pursuing bachelor’s degrees and online educational classes. Additionally, they set up training with regional medical specialists. “One of the things we need to do to legitimize the EMS service is to get some professional education with credentials,” Grovdahl says. “From education comes success.”

Grovdahl and his team clearly prove that you can be small and still be a force of nature. “EMS is the safety net of the healthcare system, and I take that to heart,” he says. “You can rely on us 24/7/365 to show up. If I can do one thing that helps one person, it makes it better.” Grovdahl adds, “I have had wonderful mentors who were awe-inspiring. One day I’m going to get to their level; I am always chasing that goal. I love rural EMS systems. We may be small, but we are mighty.”

On the Move

MedStar blazes a trail to revolutionize how EMS agencies successfully transition to mobile healthcare agencies

Many EMS agencies strive to improve the service they provide every year. MedStar Mobile Healthcare (formerly MedStar EMS) in Fort Worth, Texas, has taken that model and jump-started it into the 21st century by transitioning itself into a state-of-the-art mobile healthcare agency.



MedStar Mobile Healthcare

cess using the National Emergency Medical Dispatch System. If the call is deemed low acuity, it's sent through their 9-1-1 Nurse Triage system, allowing a specially trained nurse to work with the caller to get the most effective and efficient treatment.

"If the caller has a toothache, or foot pain, or cold symptoms, we work with them to get an appointment with their doctor, or to get them to a clinic or urgent care center," says Zavadsky. "So if they have a doctor, we get them to their doctor. If they don't have a doctor, we get them connected to one. That coordinated care is better for the patient."

In some cases, a MedStar's nurse may advise the caller to stay home and give them instructions on how to care for him or herself. The nurse will then follow-up with a phone call later in the day, or later in the week. "Too many patients call 9-1-1 and use the emergency medical care system as their source of primary healthcare and that's inconsistent care for the patient," Zavadsky says. "This is a much kinder and gentler way to help patients."

Patient Identification

MedStar also works with area hospitals to identify and reach out to frequent 9-1-1 callers, using mobile health medics who aren't assigned to ambulances. In many cases the caller simply doesn't know where or how to obtain regular healthcare. "We work to get them connected to a physician or into some type of public clinic care system," Zavadsky says. "We find out what their eligibilities are for those types of programs and then get them enrolled, essentially transitioning them from using 9-1-1 all the time to having a regular source of medical care."

Patient Navigation

Traditionally ambulance services have simply responded to calls and transported patients in the usual, "You call, we haul" medical transport model. "We believe that the future of MedStar, and the future of our industry, is to navigate patients through the healthcare system," says Matt Zavadsky, MedStar's director of public affairs. MedStar has streamlined their mobile service to now be the envy of EMS.

The process starts with the traditional 9-1-1 call, which is screened through their emergency medical dispatch process

The agency also works to identify those patients who are at risk for readmission to the hospital for chronic conditions, such as congestive heart failure. The agency works with the patient and the patient's primary care physician to make sure they are able to care for themselves at home.

Social issues can also drive many patients to visit an emergency department when they think they have nowhere else to turn. "We work with hospitals where the emergency department physicians may identify a patient who might normally be admitted for overnight observation, not necessarily because of a clinical need the patient has but because of a social issue or an environmental issue at home," Zavadsky says. "Something the physician is just unsure about. Instead of those patients being admitted to the emergency room overnight, or over the weekend until they can see their follow up doctor, the physician refers those patients to our community health program. We can help monitor the patient at home and provide any resources they might need until they get to their doctor's appointment, avoiding the cost of admission to the hospital."

Perhaps surprisingly, MedStar also assists with hospice needs, especially for families at risk for panicking and calling 9-1-1 in the final hours of a terminally ill loved one's life. "If they can't reach their hospice nurse, they can call us and we'll send a mobile health medic to see them," Zavadsky says.

MedStar also registers the family with their 9-1-1-dispatch system so that in the event that they call, their hospice nurse will be notified. "We will send our mobile healthcare medic along with the ambulance to help the family through the crisis, provide the patient with medication

"We believe that the future of MedStar, and the future of our industry, is to navigate patients through the healthcare system."

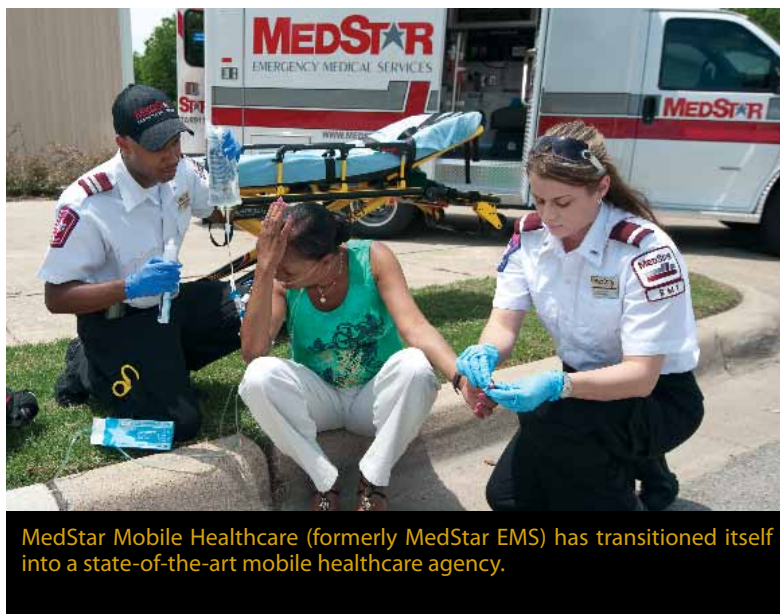
to make them comfortable if necessary, and release the ambulance from the scene,” says Zavadsky. The mobile health medic will then wait with the family until the hospice nurse arrives.

MedStar has also moved into the industrial space by helping local corporations and companies determine how to respond to minor industrial injuries. They assist companies in determining whether an employee needs to go to an emergency department, a clinic or just needs to go home. This approach helps the injured patient while also preventing other employees from having to leave the facility to take people to the hospital.

Changing the Community

The programs have received enthusiastic approvals. To date, the agency has hosted 45 communities from 24 states and four countries to observe the process first-hand. MedStar also has been asked to go to communities to meet with and educate stakeholders on how such a program can get started in their area. “We bring our data to show this actually works,” Zavadsky says. “This is not a unicorn. This is real, and we show them the data that proves it: the use data, the cost data, and the patient satisfaction data for these programs.”

To succeed at such an ambitious undertaking, MedStar has had to gather many agencies and personnel around the table. They accomplished this by creating a Care Coordination Council. The council meets monthly and is comprised of representatives from the six area hospitals, plus case managers and social workers. Additionally, community organizations, such as the United Way and the Area Agency on Aging, are also invited to the table. “The group expands every time we have a meeting,” Zavadsky says. Discussions center on specific patient needs and how these community health representatives can find the solutions and services for these individuals. “We discuss how we can bring these patients the services they need, so they don’t have to rely on 9-1-1 or the emergency care system



MedStar Mobile Healthcare (formerly MedStar EMS) has transitioned itself into a state-of-the-art mobile healthcare agency.

for their healthcare needs,” Zavadsky says. “Sometimes it takes a village to help these patients.”

MedStar is also actively changing some of the EMS paradigms to community care by developing such programs as the 25-in-5 Hands Only CPR Program, which was launched in 2011. The initiative’s goal is to train 25,000 people in the community in five years to deliver chest compressions, hands-only CPR. So far, 9,000 people have been trained.

Making the bold decision to eliminate lights-and-siren transports while CPR is in progress was another paradigm-shifting decision by the agency. “The back of an ambulance is a difficult environment to do good chest compressions, especially when the ambulance is weaving in and out of traffic,” Zavadsky says. “It’s dangerous for the crew and motoring public. So to provide the best possible CPR, and to make the transport of that patient the safest possible, we don’t use lights and sirens when transporting someone to the hospital.”

MedStar has even been working with local organ and tissue donation firms in Fort Worth by having EMS crews who pronounce someone dead on the scene ask the family about tissue donation. “We will ask the family, ‘Has your loved one considered tissue donation?’ And if they haven’t, we ask ‘Would you consider tissue donation?’” Zavadsky says. “We will make the call from the living room to the organ donation agency to see if they want to walk the family through the potential tissue donation process for our community.”

Making a Difference

The 350 employees that make up the self-revenue-generated agency are motivated as a team to make a difference in the Fort Worth, Texas, community and beyond. Zavadsky says each and every employee is not satisfied with the status quo. Each wants to do the little bit extra that ends up having a big and lasting impact.

“They are constantly looking for the next innovation to improve our community’s health,” he says. “And they are constantly looking to improve the development of our industry. We want to become more of a healthcare provider instead of just a transportation method.”

No question, MedStar Mobile Healthcare is transforming the way EMS is delivered. It’s an agency that is on the move and moving forward.

Improving Cardiac Arrest Survival

Dr. Graham Nichol led the creation of the Mission: Lifeline Cardiac Resuscitation Systems of Care program

According to the American Heart Association (AHA), every year around 160,000 Americans experience ST-elevation myocardial infarction (STEMI), and around 360,000 have out-of-hospital cardiac arrest (OHCA). What's more, many of these patients fail to receive the appropriate treatment needed within the recommended timeframe to save their life.



Graham Nichol, MD

The AHA created Mission: Lifeline to encourage communities, EMS agencies and hospitals to provide prompt, appropriate treatment for patients with STEMI, but more needed to be done. Last year, the AHA expanded Mission: Lifeline to encourage communities, EMS agencies and hospitals to provide prompt, appropriate treatment for patients with OHCA. And Graham Nichol, MD, MPH, FRCP(C), FACP, FAHA, Medic One Foundation Endowed Chair in Pre-hospital Emergency Care and Professor of Medicine at the University of Washington, has led the charge for this expansion.

Opportunity for Improvement

"The Mission: Lifeline program is the American Heart Association's quality improvement program for acute cardiac conditions," Nichol says. "It began by focusing on heart attacks. My role has been to extend that to include out-of-hospital cardiac arrest."

A program like this can't be successful without the assistance of EMS. In fact, EMS is a critical component in executing the program expansion into care for patients with OHCA and focuses on ensuring prompt, seamless and effective treatment to patients with STEMI or OHCA.

Whether serving densely populated metro areas, rural residents with issues regarding geographic access or communities in between, EMS challenges are unique for each setting. The AHA was the first national organization to help providers identify and implement policies and procedures that overcome barriers to timely access to appropriate STEMI and cardiac arrest care and empower them to save more lives.

"Mission: Lifeline began a few years ago focused on heart attacks. I recognized, and the AHA agreed, that some of the strategies that are used to improve care for heart attack patients can be used to improve care for patients with cardiac arrest," Nichol says. "That includes measuring the process and care, and then feeding that information back to providers. This can help them understand where the opportunities for improvement are and implement strategies to achieve those improvements."

What Nichol wants to emphasize about the Mission: Lifeline program, and his involvement in incorporating out-of-hospital cardiac resuscitations

into the process, is that it encourages all stakeholders to work together as a team, rather than independently. "In some communities, the opportunity is improving the number of people who are trained in CPR. In other communities, it's improving the dispatch response. Still in other communities, it is improving hospital-based care," he says. "But the only way we can understand where the opportunities are is if we measure the care throughout the continuum, and look at it together with all constituencies represented. This includes the community, EMS and hospitals all working together to achieve a common goal."

Working Together

Nichol stresses the need for EMS and hospitals to work together in harmony, under a program such as Mission: Lifeline, because it's such a common problem and community survival rates can vary so widely. He explains that OHCA is the third-leading cause of death in the United States.

"There's a 500% variation in survival after cardiac arrest from one community to another, so it is a treatable condition," Nichol says. "It continues to be

a common problem, but we can do much better. The challenge, and the opportunity, for all of us are to work to achieve that potential in communities around the U.S."

Nichol adds, "Some communities do have quite a good survival rate, but many do not. So we are trying to apply the lessons from one community to many other communities." He points to Seattle as one example of a community where stakeholders work together so that outcomes improve for patients who experience out-of-hospital cardiac arrest. "The chance of survival after witnessed ventricular fibrillation in this community is more than 50%," Nichol says.

"I recognized that some of the strategies that are used to improve care for heart attack patients can be used to improve care for patients with cardiac arrest."

The AHA uses this variance of survival rates from community to community to stress the importance of state and regional stakeholder cooperation. According to the AHA, “It’s important to remember that there is no ‘one-size-fits-all’ in an ideal STEMI system of care. “A city swelling with residents presents different issues than a region where there is more wildlife or livestock than people. This is the reason that the AHA is dedicating resources to create state and regional STEMI stakeholder task forces to determine the appropriate actions for each region.”

Program Challenges

The AHA considers first responders critical to the success and effectiveness of a STEMI care system, and recognizes the challenges that EMS faces when serving widely diverse metro or rural regions. The Association has made it a goal, through Mission: Lifeline, to help first responders solve the challenges they face in delivering appropriate STEMI, and now OHCA care, in order to save lives.

To this end, Mission: Lifeline outlines recommendations for quality improvement recognition and certification requirements. The program also delineates performance and compliance guidelines for EMT Basic or Intermediate Providers, EMT Paramedics, and patient and hospital transfers. Mission: Lifeline also outlines best protocols for emergency departments, including the establishment of reperfusion checklists, standard pharmacological regimens, the establishment of clinical pathways and the use of single-call activation systems.

Mission: Lifeline supports standardized point-of-entry protocols, which are developed by state-based coalitions of EMS personnel, emergency physicians and cardiologists. It is these protocols that dictate when and whether a patient should be transported to the nearest hospital or STEMI-receiving, PCI-capable hospital. The AHA is clear that this determination is made, in part, based



Dr. Nichol led the charge to expand Mission: Lifeline to encourage communities, EMS agencies and hospitals to provide prompt, appropriate treatment for patients with OHCA.

on the “acquisition, interpretation and transmission of the prehospital 12-lead ECG administered by EMS.”

Another unique aspect of the program is the communication between parties. Currently in most healthcare systems across the country, EMS providers don’t often get to find out what happens to a patient once they are transported and turned over to a hospital. Mission: Lifeline has made the communication between EMS, hospitals and other parties involved in a STEMI system of care as part of its initiative and works to make communication on patient outcomes between these parties more effective.

Future Possibility

Nichol is the first to admit that while the program is funded by the AHA, as well as participating regional hospitals and sites, Mission: Lifeline is not as well-funded as he would like. “A lot of work is done by good will,” he says. “The people who are involved in the program are committed to improve the care of the patients they serve, so the program will continue, but we would be able to do more with more resources.” As a case in point, Nichol participates in the program as a volunteer.

Despite this, Nichol believes that the outcomes for OHCA are improving. “Several years ago, the Resuscitation Outcomes Consortium (ROC), of which I am privileged to play a small role, reported survival after cardiac arrest in its communities,” he says. “We showed that out-of-hospital cardiac arrest was about 8% in those communities. It has since improved to about 10%. Is that good? On a relative level, yes it is. On an absolute level, no, it’s not. We have more work to do.”

But, “If we can keep achieving a 20% improvement over time, then many more people will be able to survive,” Nichol says. “So I’m challenged, not discouraged.” In fact, it is this challenge, and the knowledge that EMS can do better, that helps motivate Graham Nichol. “I’m driven by the knowledge that we have to do better because it’s such a common problem,” he says. “I know we can do better.”

Cooling Resuscitation

Joseph Ornato's cooling program allows for the discharge of more than 14% of cardiac arrest patients neurologically intact from the hospital alive.

Joseph Ornato, MD, FACP, FACC, FACEP, launched a paramedic program in 2008 to help treat cardiac arrest patients and increase their survival rates. The day that led Ornato to make a change in his prehospital paramedic program began with a simple kiss on the cheek.



Joseph Ornato, MD

Learning Fast

At the time—1974 to be exact—Ornato was starting a cardiology fellowship at New York Hospital's Cornell University Medical Center in New York City when he was “volunteered” to run the hospital's fledgling paramedic program. “New York Hospital had started one of the first paramedic programs in the country, the only 24/7 program in Manhattan at the time,” he says. “I found myself in charge of running a paramedic program that served Manhattan at a time when most laypeople and physicians had no

idea what paramedics were all about.”

But he learned fast. When calls came in, Ornato would hop on a rig and ride with the medics. During downtime, he helped them perfect various medical skills, including how to effectively intubate, start IVs more proficiently and work as a team to treat severely ill or injured patients. The paramedics paid close attention, and the results soon proved that all the hard work had been worth it. “Within a very short period of time, we had our first survivor from out-of-hospital cardiac arrest,” Ornato says.

A 60-year-old woman was brought into the hospital still comatose from her cardiac arrest. In the field, using many of the medical skills and techniques that Ornato had taught, the medics had intubated her and gotten her heart restarted. The next morning, Ornato brought the group of paramedics into the coronary care unit to see her. She had already been extubated and was sitting up in bed eating her breakfast. “They couldn't believe it was the same woman,” he says. “Within a couple of minutes, there were tears in our eyes, joyous that this woman had been saved from a condition that, in 1974, was virtually lethal—an out-of-hospital cardiac arrest in New York City.”

The patient expressed profound gratitude to the team for saving her life, particularly because her daughter was about to give birth to the patient's first grandchild. She motioned for Ornato to come over to her. “I thought she was going to whisper something in my ear that she didn't want the medics to hear,” he says. “Instead, as I leaned over the bed, she gave me a kiss on the cheek. I realized that this was a woman who, in 1974, had almost no chance to be alive from what had happened to her. And here she was, because of what I had taught paramedics. It was essentially a miracle.”

Advancing the Program

Joseph P. Ornato, MD, has come a long way since then. Today, he is professor and chairman of the department of emergency medicine at Virginia Commonwealth University Medical Center in Richmond, Va., and oper-

ational medical director of the Richmond Ambulance Authority (RAA) and Richmond Fire and Emergency Services. He also now belongs to a rarified and small group of physicians who are board certified in internal medicine, cardiology and emergency medicine. But despite his journey, his thoughts are never far from that patient in 1974. Nor are his roots far from prehospital care and the desire to see it become the best it can be.

This focus has led to one of his latest achievements: helping to start an advanced and comprehensive post-resuscitation program for central Virginia. The program was instituted in 2003. By 2008, it was focused on five goals:

1. Delivering continuous chest compressions using AutoPulse devices;
2. Spending a shorter time on airway management by inserting a King airway device if an endotracheal tube could not be inserted successfully on one attempt;
3. Spending a shorter time to first drug administration by inserting an intraosseous catheter if an intravenous line could not be inserted successfully on one attempt;
4. Initiating therapeutic hypothermia as soon as possible by administering cold saline in the field during resuscitation; and
5. Delivering patients who experience return of spontaneous circulation (ROSC) preferentially to Virginia Commonwealth University Medical Center.

The medical center began functioning as a regional comprehensive post-resuscitation care center for an approximately 100-mile radius service area for its three regional medical helicopters surrounding the city. RAA's supervisors respond to a cardiac arrest along with a fire first responder and paramedic crew.

The supervisor's initial job is to ini-

tiating cooling by administering iced saline via the IV or intraosseous line. “The result is we can get a half a liter on average into the patient before their heart restarts,” Ornato says. “By the time they hit the door of our regional post-resuscitation center, the medics have administered about 1.5 liters of cold fluid on average. The patient’s body temperature is already down to about 35°, so we are already halfway or more down to our cooling target.”

On hospital arrival, the endovascular-cooling catheter is directly placed into the femoral vein, allowing providers to hit the target temperature of 32–33° C more quickly and to control the temperature precisely during 24–48 hours of cooling and during rewarming. “We also have the ability to place patients on full extracorporeal life support, which has provided some “miracle saves” in our program,” he says.

Effective Strategy

Ornato believes the program is the first to initiate cooling during resuscitation but acknowledges that EMS in such places as Seattle, North Carolina and New York City have similar prehospital cooling protocols that typically begin after the heart restarts. “In mid-central Virginia and North Carolina, it’s become very prevalent,” he says. “Virtually all of the counties surrounding Richmond, and many of our rural areas, are part of our program.”

Data on the effectiveness of cooling after hospital arrival is sound, and there’s no evidence of harm by cooling earlier. “No one has done the definitive study of therapeutic hypothermia started during resuscitation versus after the heart restarts to see whether it makes a difference,” he says. “But every bit of evidence we have from experimental and human trial data suggests that the earlier you begin to protect the brain the better the odds of survival neurologically intact.”

Since the inception of the program in 2003, Ornato and his team have successfully provided therapeutic



The program provides a full range of organized post-resuscitation services, including a multidisciplinary team approach to post-resuscitation care, therapeutic hypothermia and goal-directed management.

hypothermia to more than 500 cardiac arrest patients and his hospital’s regional post-resuscitation center now provides therapeutic hypothermia and other advanced care to about 80 patients annually. “Our prehospital return of spontaneous circulation rates have increased significantly and, for patients who survive to be treated with endovascular cooling in our Advanced Resuscitation Cooling Therapeutics and Intensive Care (ARCTIC) post-resuscitation at Virginia Commonwealth University’s post-resuscitation center, our overall survival to hospital discharge is now over 50%,” he says.

The program provides a full range of organized post-resuscitation services, including a multidisciplinary team approach to post-resuscitation care, therapeutic hypothermia, goal-directed management, continuous encephalogram (EEG) monitoring, admission to a specialized coronary intensive care unit with care provided by specially trained attending physicians and nurses and a minimum 72-hour moratorium on withdrawal of life support, after admission, to allow adequate time for accurate prognostication. “We conduct a two-hour battery of neuropsychiatric tests before discharge and an eight-hour panel of comprehensive cognitive, neurological and psychological examinations on patients two months after discharge to fully evaluate their recovery,” he says. “Our traumatic brain injury team provides rehabilitation care when needed.”

A Kiss

On occasion, Ornato finds himself thinking about the woman his medics saved back in 1974. It was a day, he says, that literally changed his life. “I realized at that moment that I wanted to dedicate my life and my research to improve prehospital cardiac care,” he says. “That’s what led me to go beyond cardiology into a career that’s been a blend of cardiology and emergency medicine, with a strong focus on prehospital care and research into sudden death and resuscitation.”

Ornato also thinks about the cardiac arrest patients who don’t survive, and the effect their death has on surviving family members and friends. “I told myself very early on,” he says. “When I go out to talk to a cardiac arrest patient’s friends and family, instead of telling them that their loved one has died or would never awaken, if I could instead tell them that they were going to be OK, it would be worth every ounce of effort I could put into improving emergency cardiac care.”

The many cardiac arrest patients that have survived under Ornato’s leadership and protocols couldn’t be more grateful. Some say thank you. Others simply give him a kiss on the cheek.

Expanding EMS Experience

David Page spearheaded the formation of the Saint Paul Emergency Medical Services Academy with the goal of diversifying St. Paul's EMS workforce

David Page, MS, NREMT-P, may look like an EMS instructor and paramedic, but he sees himself as a “human gardener,” trying to create beauty and diversity in a homogenous EMS environment. As a “gardener,” in 2012 Page assisted in the creation of the Saint Paul Emergency Medical



David Page

Services Academy, also known as Freedom House-St. Paul, which is aimed directly at getting minority and diverse at-risk youth trained and qualified as EMTs and paramedics.

Community Representation

The St. Paul, Minn., based paramedic instructor at Inver Hills Community College acknowledges that the Minneapolis/St. Paul area is home to three robust paramedic schools that provide qualified candidates for the surrounding EMS agencies. For Page, however, the issue is not the amount of qualified

candidates available, but their demographic makeup.

Minnesota EMS agencies acknowledge that about 98% of providers are white, but this largely homogenous group serves a Twin Cities' population that's relatively diverse, with large Hispanic, Hmong and Somali populations (37% and 44% of the population respectively). Urban ambulance services do not have Hmong, black or Hispanic EMTs or paramedics.

With the creation of the Saint Paul Emergency Medical Services Academy, Page hopes to diversify St. Paul's EMS workforce. “We have been trying to increase the number of diverse EMTs and paramedics in the ranks for a long time,” says the 28-year EMS veteran and EMS Academy BLS Unit Supervisor. “In 1993, we tried to get more women into EMS, and at that time recognized that we had very few people of diverse ethnicity in our ranks.”

Three years ago the city's youth program was given extra government stimulus

money to give at-risk and low-income kids a job in the St. Paul Parks & Recreation department. The city approached the fire department with the thought of putting these kids to work cleaning the fire stations. But fire chief Tim Butler and Luz Frias, director of the Department of Human Rights and Equal Economic Opportunity, had other ideas. Specifically, they wanted the candidates to take an EMT class with the thought that they might eventually get a job with the fire department. That's when Page, also an Allina field paramedic, got involved.

“A lot of people thought the kids were too uneducated or if they had failed high school, were single parents, or had been involved with gangs, that they wouldn't be eligible to be EMTs and paramedics,” Page says. “There has been a lot of resistance to it.”

But Page was undaunted. At the chief's request, he converted a fire station to be a training facility for EMTs. It was renamed Station 51 in honor of the 1970's television show, *EMERGENCY!*

Phase II

The program was initially deemed a success because almost 70 people had graduated and gotten jobs in emergency rooms at local hospitals and in nursing homes. But Page knew his graduates were capable of so much more. “I'm not in the business of training EMTs and paramedics to staff nursing homes,” he says. “I was hoping to work with them on the ambulance and get the benefit of their cultural experiences and ethnicity.”

Once students graduated from the EMT class, Page noticed that they had difficulty getting jobs with ambulance services. So Page began to push government and city leaders, as well as various EMS organizations, to support Station 51 and advocate for the graduates and academy training program. Some of those leaders got behind him in a big way and helped

Page breathe new life into the initiative. His idea was to create a non-emergency transport service to give graduates experience.

Regions Hospital, the area's local Level 1

trauma center, also got on board. The hospital needed to transport patients to their homes and had trouble getting private services to allocate resources for them.

Phase II of the academy program began in July 2012 with an ambulance service. Ultimately, the students became paid Parks & Recreation employees under the command of the St. Paul Fire Department. Page and his students started with two

“They will be equal or better clinicians than anyone I have ever trained because they understand the dynamics of health-care and culture in their population.”

ambulances leased from the college for one dollar. The Academy initially hired 10 graduates, all of whom went through additional ambulance operations training. Volunteer instructors jumped on the ambulances to both supervise and train the new graduates. “Out of the 10 graduates we hired in the first wave, seven have been hired by area ambulance services,” says Page. “We were more successful than we wanted to be within the first few months, so we hired a second wave of six, and they are currently going through training.”

The earnings from this ambulance service will allow for the funding of future academy EMT classes. In a nutshell, phase II allowed the academy to become a self-sustaining, revenue-generating program that runs two EMS classes a year. “It generates revenue by these young people working while they are continuing to go beyond being an EMT to a paramedic,” Page says. “When they get done with the EMT class, we call that phase I, and they become nationally registered as EMTs.”

Continuing Education

When the academy had challenges receiving dispatching services from the local communication center, because the academy was considered a non-emergency service, Page hired a dispatcher. Private citizens can also call their dispatch but must give 24 hours advanced notice. The Academy’s ambulances travel within a 60-mile radius, but can be cleared to go 150 miles.

Page also developed a part of the Academy curriculum that teaches students how to be CPR instructors for city departments and workers including lifeguards, tree trimmers, and zoo and stadium personnel.

The program is looking to grow in unique ways. For instance, Page is helping create a specialized wheelchair transport service for Regions Hospital to discharge patients who do not need an ambulance; it’s expected to begin in April 2013. Another example is the city of St. Paul’s Offi-



Page assisted in the creation of the Saint Paul Emergency Medical Services Academy which is aimed directly at getting minority and diverse at-risk youth trained and qualified as EMTs and paramedics.

cer in Residence program, where city police officers live in public housing buildings as a way of creating community-policing programs. “The St. Paul fire chief wants to see some of our EMTs live in those public housing buildings as they continue on through paramedic school,” Page says. “They can teach residents CPR, check blood pressures or make sure residents take their medicine. They can also translate other languages and provide an influence for healthy living.”

Leveling the Field

All of the challenges that this project has had to overcome have only made everyone, especially Page, more steadfast in seeing the academy and its graduates succeed. Part of this comes from his own self-determination, and part of it comes from growing up in Mexico and being “a white guy in a brown culture,” he says. Growing up in that cultural backdrop has helped shape and mold Page into the man, paramedic and instructor he is today.

“I want to make sure there are equal opportunities for people who do not have the mentoring and resources that I had, or other people currently have, to enter this field,” Page says. “I think it’s a great field. We need people who speak diverse languages. We need people who understand different cultures.”

To best illustrate his point, he references “The Rose That Grew from Concrete” by the late rapper Tupac Shakur, which states in part, “Long live the rose that grew from concrete when no one else ever cared.”

“The conditions under which these youths are living and going to school are not what we envision the American Dream to be,” Page says. “They are around shootings and stabbings, and it’s a miracle that one of them breaks through the concrete and allows themselves to grow and get sunshine. What’s terrible is even when they grow through the concrete, we look at the rose, and we look at it as a tarnished rose out of place. We say they’re not good enough, they’re not strong enough, they’re not smart enough, they didn’t finish high school, or they got pregnant early, instead of looking at the amazing feat that they’re not in jail or dead.

“My job is to break the concrete,” he adds. “They will be equal or better clinicians than anyone I have ever trained because they understand the dynamics of healthcare and culture in their population. We need that culture and these folks to survive. They are roses. They are amazing people and they have a lot to offer.”

Bystander CPR

Richard Price launched the PulsePoint smartphone mobile app to improve cardiac arrest survival rates

Richard Price had an idea that grew into a smartphone application, and then a foundation, that may very well change the way EMS responds to cardiac arrest calls. The idea will certainly save lives, and it all started at a deli over a pastrami and rye.



Richard Price

Birth of an App

"I was out to lunch and was sitting in a deli with a few other people when I heard sirens in the distance," Price says. "The sirens got louder, and then they pulled up right in front of the deli where I was eating."

It turned out that the EMS crews were responding to a cardiac arrest call in the building next door. "If I had known, I could have made a difference. I know CPR and I have an AED in my car," Price says. The event made him think about his smartphone and how the device knew his location and could

tell someone else. "The idea came that we could possibly notify someone who was nearby an event using his or her phone," he says.

That was three years ago, and the result of that event, and Price's subsequent idea, has been the creation of PulsePoint, which was launched in 2012. Though the technology is sophisticated, taking hundreds of hours and many people to bring the idea to fruition, the actual PulsePoint app is simple. Users who are trained in CPR and have registered with the system as willing to assist in an emergency cardiac arrest situation will be notified on their smartphone if someone nearby is having a cardiac arrest.

To get such a simple, but very sophisticated, idea off the ground required a lot of teamwork. Price, who is the PulsePoint Foundation president, formed a team and then brought in interns to help build a prototype. "The first thing we looked at was its feasibility," he says. "If a phone was near an event, could we push a notification to those people?"

Through lots of experimentation, and a year building the initial app, in 2012 Price and his team rolled out the first app to citizens in Northern California's San Ramon Valley, where he was fire chief until his retirement this past year. "We used it for about a year and had amazing results from it," Price says. "We were convinced it could make a big difference."

Price knew he needed a much more robust technological system and partnered with a local technology company called Workday. The company's founders, Dave Duffield and Aneel Bhusri, also founded PeopleSoft and had an engineering group located nearby. "They stepped up in a big way to write a robust commercial version that other agencies could use," says Price. "They wrote an Android and iPhone version, all of the required

backend infrastructure and the interface specifications for the dispatch system vendors—all using volunteers and donations."

Ultimately, Price formed a foundation last year to make the technology available to any other agency in the U.S. —at no cost. "The entire project has been funded through donations from corporations, foundations and hospitals that believe in making a difference in sudden cardiac arrest," he says.

CPR Strategies

Training and education goes only so far where sudden cardiac arrest is concerned. Hands-on action is what will ultimately make the biggest difference. "We've been training people in CPR for 50 years, and we've been placing public access AEDs for more than 20 years, and we've really not moved the needle much, not made a significant difference in the number of people who die from cardiac arrest," he says. "Sudden cardiac arrest is an electrical problem that happens to people of all ages. We have 10-year-olds that have had cardiac arrest, and it can be intervened with using a defibrillator."

But getting people to start CPR or use a defibrillator is difficult. "CPR is only started about 25% of the time before crews arrive, and

AEDs are rarely retrieved," says the 33-year EMS veteran. "We do a good job of promoting them and getting them placed, but people aren't using them nearly as often as they should. They either don't think about them or they don't know where to find them."

PulsePoint addresses both issues. Previously someone had to be in the right place at the right time—and be aware of the incident—to make a difference with CPR. But with the app,

"By recognizing we have the technology, and citizens have the skills necessary, I think we have the opportunity to save hundreds of lives a day."

finding people trained in CPR who are close to the location of someone suffering sudden cardiac arrest can be as easy as looking at a phone. “PulsePoint tells citizen rescuers where the victim is and where the AEDs are in the immediate vicinity, in the context of their current location,” Price says. “We give them a dynamic, contextual view where they can see the situation on a map. They can then navigate right to the AED and patient. We think that will remind people to get the AED and definitely bring more citizen rescuers.”

Price reminds us that even cities and counties that pride themselves on good response times will have trouble having successful sudden cardiac arrest outcomes using only traditional response methods. “We have response times in the San Ramon Valley that parallel the best in the country,” he says. “We have response-time goals of seven minutes in urban areas, and eight minutes in our suburban areas. When someone has a cardiac arrest, they only have a maximum of 10 minutes to survive. Even at a very good response of seven minutes, you are pushing brain damage.” Price continues, “We know if trained citizens are nearby they can get CPR started and an AED deployed in three to five minutes. That could result in hundreds of people day surviving cardiac arrests who are not surviving today. Citizens engaging early make a huge difference in the outcome.”

Theory vs. Practice

Finding the citizen rescuers to sign up has not been difficult. It starts with people being properly trained, and Price says the EMS community is doing a great job of that. “We teach it in auditoriums of 300 people at a time; we teach it at “sidewalk CPR” events, where we will train hundreds of people over a weekend,” he says. “We have short videos on our website where people can learn CPR in one minute, and we are looking at putting it on video screens when you pump your gas. And AEDs require no training at all. You just open them up and



Users who are trained in CPR and have registered with the system as willing to assist in an emergency cardiac arrest situation will be notified on their smartphone if someone nearby is having a cardiac arrest.

turn them on, and they tell you what to do.”

No, the training isn't what concerns Price. It's the actual performing of CPR that is a concern. “Many people finishing a CPR class won't perform CPR because it takes too much courage. It's a scary thing,” he says. “But if people are together, they have more courage. And having more than one rescuer at the scene will cause others to engage more often. We've seen that. The app creates a new type of volunteerism.”

In fact, recently there was a sudden cardiac incident in San Ramon and 12 PulsePoint registrants were notified through dispatch simultaneously. But did they all show up?

Right now, the PulsePoint registration data doesn't include whether registrants respond to an incident. However, to gather that data for future use, a clinical trial has started this year in Toronto, Canada. The double blind trial is going to measure CPR and AED deployment rates as well as how many citizen rescuers were notified on a call and how many showed up. “This study is going to carefully measure the actual impact and potential,” he says.

Small Window

Price says there are now PulsePoint initiatives underway in many countries of the world. “The mission of the foundation is to improve sudden cardiac arrest survival rates in a massive way worldwide,” he says.

All of these measures are important because effectively treating sudden cardiac arrest is different from most acute and chronic conditions. “It's because of the excruciatingly short window of opportunity,” Price says. “There are not too many conditions where you get just 10 minutes. You can only build so many fire stations. I have a gentleman on my board who was saved by CPR and has now done CPR twice and saved two other people. Survivors have an exponential effect on society.”

Price recognizes that the idea was just the start and there is still a lot of work to do. Citizen rescuers need to download the app and be willing to engage. “But by turning the equation around and recognizing we have the technology, and citizens have the skills necessary, I think we have the opportunity to save hundreds of lives a day,” he says. “I believe it's right there, if we just execute.”



**PHYSIO
CONTROL**

The responsive emergency team delivers exceptional CPR

And they choose Physio-Control
to help make it happen.

Today's responsive emergency team is always looking to elevate the level of care they deliver, and they rely on evidence and data to get them there. With the CPR Solution from Physio-Control, they have the science-based, guidelines-consistent tools they need to respond better to patients—and the demands of constant performance improvement.

LUCAS[®] CHEST COMPRESSION SYSTEM

uninterrupted hands-free compressions

CODE-STAT[™] 9.0 DATA REVIEW SOFTWARE

featuring comprehensive CPR analytics

LIFEPAK[®] 15 MONITOR/DEFIBRILLATOR

with capnography and CPR Metronome

Get ready for a more responsive approach to CPR.
physio-control.com/CPR