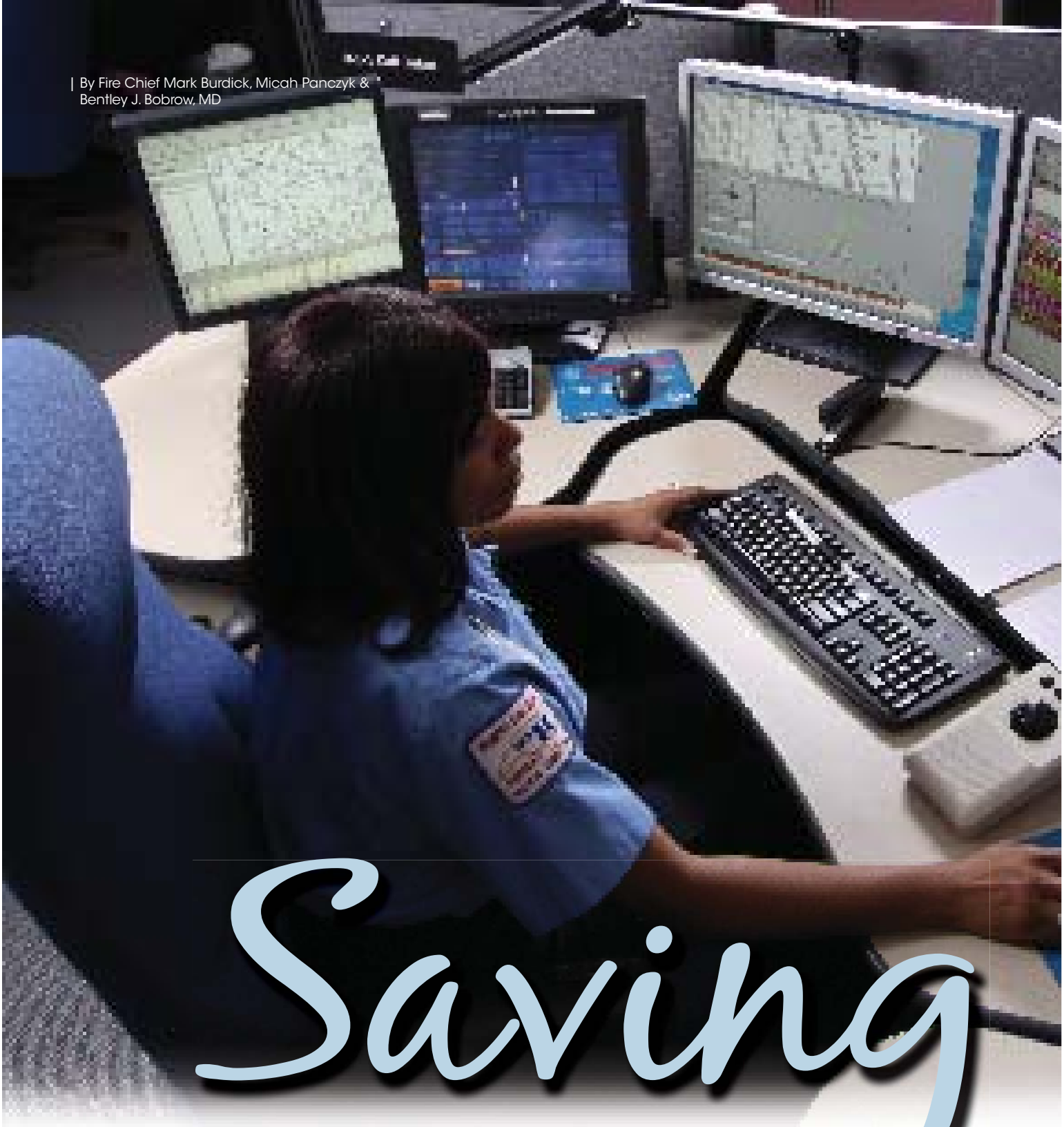
| By Fire Chief Mark Burdick, Micah Panczyk & Bentley J. Bobrow, MD



Saving from Sudden Cardiac Arrest in Your Community

How dispatchers can make the difference between life and death

Lives

There is a void in Mike Patten's recollection of things—one moment he was going out to dinner with some friends after skiing, the next he was headed to the cardiac catheterization lab. He remembers nothing of his fall to the pavement or emergency helicopter flight to the hospital.

"It's made me more receptive to my home life," says Patten, a firefighter-paramedic with the Glendale Fire Department in Glendale, AZ. He has a wife and two daughters, ages 10 and 7. "I'm still trying to grasp the how and why of it."

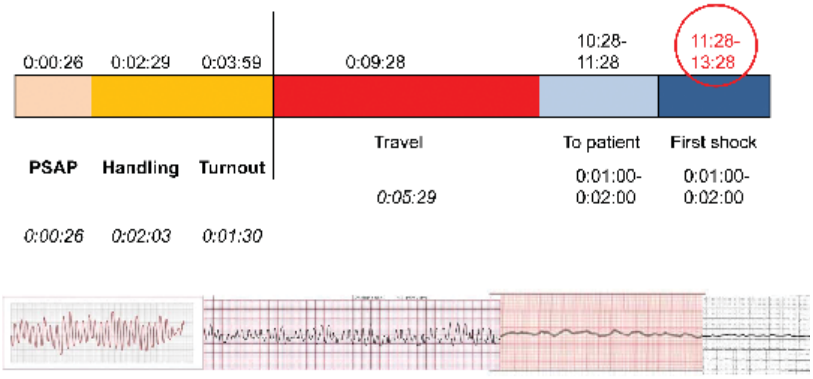
The "it" he speaks of is the sudden cardiac arrest (SCA) from which he was resuscitated one January evening in Tonopah, AZ. It was a most unlikely event: a 36-year-old with no history of cardiac problems collapsing in the presence of two friends who happened to be fellow paramedics. Their swift start of compression-only CPR clearly had a central role in saving his life.

Most victims of cardiac arrest do not share Mike Patten's outcome. SCA occurs some 380,000 times a year in the United States,[1] resulting in death in all but 7.6% of cases.[2] A rapid response, including high-quality prehospital cardiopulmonary resuscitation (CPR) by emergency medical responders, is crucial. But without emergency dispatchers fulfilling their equally critical role in the "Chain of Survival," survival rates to hospital discharge are dismal. The second link in the chain, bystander CPR, can double or triple the chance of survival.[2] Yet this enormous opportunity to save lives is frequently missed for multiple reasons, including (but not limited to) bystander panic, fear, uncertainty, lack of confidence, fear of causing harm, fear of legal ramifications and aversion to mouth-to-mouth contact.[3–9] In fact, bystander CPR is typically provided in less than half of cardiac arrest events in the United States.[10] This article focuses on the critical intervention of dispatch-assisted CPR in an effort to highlight the recent American Heart Association scientific advisory statement on this lifesaving intervention.[11]

The first moments after arrest are incredibly decisive. EMTs may race to the scene, but the chance a cardiac arrest victim will live plummets by 7%–10% per minute. If your EMS system is like most across the country, the total response time (including time for call routing, call handling, travel to scene and time to victim's side—*Figure 1* shows typical urban EMS system response intervals) is 10–15 minutes. That makes bystander CPR a deal-breaker—if you don't maximize rates of bystander CPR prior to your arrival, citizens are dying needlessly in your community. This is because bystander CPR supplies the life-sustaining blood flow to the victim's heart and brain and can prolong ventricular fibrillation (VF) during those early minutes after collapse. This increases the chance that your trained rescuers can successfully defibrillate the victim's heart and save his life.

Photo courtesy Mecklenburg EMS Agency (Medic)

Figure 1: Cumulative Urban EMS Response Timeline in Minutes



Courtesy of Mark Burdick

Such success was achieved with Patten after he suddenly and unexpectedly collapsed while putting gas in his car in Tonopah.

"For being where we were in a rural setting…I really think (compression-only CPR) saved his life," says T.J. Drescher, a firefighter and paramedic and one of Patten's rescuers. "Nothing seemed out of the ordinary. Then we heard this thud on the car. We really thought he was joking around—he's kind of a jokester—but then it clicked in our heads. It was definitely a scary experience."

Bystander CPR was really the anchor link in the chain for Patten. Trained rescuers equipped with an AED were able to defibrillate his heart, but their success was no doubt prepared by the roughly 10 minutes of rapid, uninterrupted chest compressions he received soon after collapse.

So the question becomes, "Are each of our 9-1-1 centers maximizing bystander CPR in our communities?"

Sustained and targeted public education and CPR training campaigns are very important, but training each and every citizen in your community to perform CPR is incredibly difficult, if not impossible. So the best strategy to increase overall bystander involvement is to combine frequent, brief and targeted public training with "just-in-time" dispatcher CPR instructions.

Pre-arrival telephone CPR instructions vary from place to place, and few 9-1-1 centers measure their performance to ensure quality. What we want is the same measured, guideline-compliant approach that ensures each and every 9-1-1 caller will receive lifesaving instructions as quickly as possible.

Let's look at some of the key issues surrounding pre-arrival telephone CPR instructions.

Table 1: Obstacles to Bystanders Starting CPR and Dispatcher Solutions

BARRIER	SUGGESTED DISPATCHER RESPONSE
Bystander has trouble identifying cardiac arrest	Utilize simple, two-question algorithm
Bystander fears CPR will injure victim	Assure bystander CPR will not cause injury
Bystander fears mouth-to-mouth contact can transmit disease	Provide instructions for compression-only CPR
Bystander lacks confidence bystander can perform CPR	Assure bystander he/she can do CPR and that dispatcher will help
Bystander panic/fear prevents action	Assure bystander he/she can do CPR and that dispatcher will assist
Bystander fears legal ramifications	Assure bystander of Good Samaritan Laws that safeguard citizen action

Early Recognition

Early recognition of SCA is essential to improving rates of bystander CPR; lack of recognition remains a major obstacle to getting CPR started. We need to recognize that SCA can present itself in ways that confuse both lay and trained rescuers, delaying the start of CPR for precious minutes.

Patten exhibited one such presentation—the "deep, long agonal breaths" that Ian Winterstein witnessed as his friend lay on the ground behind the car. "I've worked a lot of codes," says Winterstein, who performed the compressions. "But I've never seen agonal respirations like this."

Agonal breathing—an abnormal breathing pattern often described as gasping, snoring, snorting, gurgling, moaning, breathing every once in a while, or labored or noisy or heavy breathing—can last for several minutes and occur in up to half of all documented SCAs.[12,13] It represents a brain stem reflex to ischemia and reduced blood flow to the brain.

Not surprisingly, then, survival appears to be higher if EMTs observe it when starting resuscitation attempts. One study found that victims were almost three-and-a-half times more likely to live to hospital discharge when EMTs noted gasping.[14] Despite these observations, agonal breathing can delay the recognition of SCA and thus the start of CPR[15–18]—bystanders often mistake agonal breaths for signs of life and don't realize they stem from cardiac arrest.

SCA victims will often demonstrate agonal breathing after CPR is started, as the compressions provide some blood and oxygen to the brain. Many lay rescuers are inclined to stop CPR when this occurs, but in fact they should continue rapid, forceful chest compressions unless the victim wakes up, demonstrates purposeful movement or trained rescuers arrive. We must train our dispatchers to identify and understand the significance of gasping over the telephone, and to start and maintain bystander CPR when it occurs.[18]

Photo courtesy of the Resuscitation Academy, King County, WA

"Callers are often frantic and feel helpless. The first challenge for dispatchers, then, is to control the call."

We also need to make it clear that brief "seizure-like" symptoms can also accompany SCA. Victims often twitch or shake immediately after collapse. These movements, while usually brief, can lead bystanders to mistake the event for a seizure and, again, delay the start of CPR.[19, 20] This is especially true when the victim is young and a cardiac arrest seems unlikely.

Barriers to Bystander CPR

Increasing bystander CPR requires that we tackle the physical, psychological and communication barriers which keep bystanders from taking action when they witness or encounter a possible cardiac arrest. Population-based surveys and interviews with lay rescuers cite several obstacles, including inability to recognize cardiac arrest, panic, lack of confidence, fear of causing harm, fear of medical-legal ramifications, concerns about disease transmission and lack of physical ability to perform CPR.[3–9] In real life events, these barriers often combine and vary among populations, settings and situations.

Dispatch-assisted CPR is our opportunity to overcome these barriers. If properly trained, our dispatchers can quickly calm panic-stricken callers, help them identify cardiac arrest, give them confidence and instruct them in CPR.

Formal Dispatch-Assisted CPR Programs

Given the importance and potential of bystander CPR in the Chain of Survival, we must build formal dispatch-assisted CPR programs at our 9-1-1 centers. Such programs can be built on any scale, from the smallest 9-1-1 center to county and statewide efforts. Whatever the size, there are three essential pillars: protocol development, dispatcher training and quality assurance (QA) systems that shed light on performance.

THE FIRST PILLAR: PROTOCOL DEVELOPMENT

The American Heart Association scientific advisory statement on dispatch-assisted CPR recommends that dispatchers take an aggressive tack on potential cardiac arrest calls in an effort to initiate bystander CPR within one minute. Callers are often frantic and feel helpless. The first challenge for dispatchers, then, is often to control the call. AHA recommends they assert themselves calmly and ask two critical questions:

1. Is the victim responsive?
2. Is the victim breathing normally?

The caller's answers aren't always clear; they can even be contradictory. Specific follow-up questions and techniques can help clarify things, and if the dispatcher thinks a victim is neither responsive nor breathing normally, then he or she should direct the caller to start CPR without delay.

The AHA backs a protocol providing compression-only CPR instructions for adults in arrest of cardiac origin, and conventional CPR instructions when the arrest is secondary to respiratory failure (see http://azdhs.gov/azshare/documents/911/SampleCPRProtocols1.pdf).

Compression-only CPR instructions sidestep fears of mouth-to-mouth contact and get CPR started quicker. The protocol prescribes conventional CPR for children 8 years old or younger, regardless of etiology.

There is concern that the protocol's aggressive approach may result in high rates of unneeded bystander CPR, or CPR on someone who is not in cardiac arrest. However, research supports this approach. In a study of 247 adult patients not in cardiac arrest, researchers in King County, WA, found only six instances where patients sustained injuries likely or possibly caused by bystander CPR.[21] These investigators found no instances of visceral organ damage. The benefits of bystander CPR thus appear to vastly outweigh the risks.

THE SECOND PILLAR: TRAINING

Our training should provide clear overviews on the what, why and how of dispatch-assisted CPR, citing the research findings that can foster buy-in from staffers suspicious or uncomfortable with programmatic change. If the study just cited is not referenced in training, for example, dispatchers may

Table 2: Metrics for Evaluating Dispatch-Assisted CPR

CATEGORY	TIME COMPONENT
Did EMS send appropriate resources?	Time from call receipt to dispatch of EMS
2-question algorithm employed?	Call receipt to completion of two questions
SCA recognition/start of CPR instructions given?	Call receipt to start of CPR instructions
Bystander CPR started?	Call receipt to start of bystander CPR
Barriers encountered to CPR--such as distressed callers, language difficulties, etc.--should be tracked.	

be left wondering whether an aggressive approach will result in more harm than good; a subtle push-back can result. Dispatchers may also see QA evaluation as a tool supervisors can use to "punish" their performance, rather than as an instrument to maximize survival. During training, then, it is important to keep the reason for the program clear: It is about saving lives and nothing more.

THE THIRD PILLAR: QA EVALUATION

The third input, a QA system that allows us to gauge performance, is paramount—no dispatch-assisted CPR program can improve performance without continuous measurement.

Baseline data sets can be drawn by evaluating cardiac arrest calls at a given 9-1-1 center. These calls can be translated into numbers that address key standard-of-care guidelines. An evaluator notes, for example, the time elapsed from call receipt to when the dispatcher recognizes the need for CPR, starts instructions and directs the first compression. We can then calculate averages for these time frames, and compare these with averages derived from calls taken after training and protocol revisions are put in place. By continuously measuring performance, we can identify sticking points and subtleties of process that point the way to future improvements.

"During training, keep the reason for the program clear: It is about saving lives."

Conclusion

Winterstein's compressions bought Mike Patten time. They created vital blood flow to the brain and other organs and extended VF. Patten is back with his family and doing the lifesaving work he loves. His cardiac arrest has had a dramatic impact on the entire Glendale Fire Department. We are all dedicated to making sure our EMS system works as well as it possibly can for the residents in the communities we serve. EMS providers, it is incumbent on us to create local programs that bring to bear every insight in resuscitation science. Thousands of lives are ours to save. It is our duty to do all we can to save them.

Resources

For more information on dispatch-assisted CPR, visit http://9-1-1CPRDispatch.azshare.gov. For more information on improving cardiac arrest care in your community, visit the Heart Rescue Project at www.medtronic.com/heartrescueproject/heartrescue.html.

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