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## Featured Articles

### Addressing the Challenges Hospitals Face in Improving Outcomes From SCA



Outcomes for sudden cardiac arrest in hospitals have not improved in over 30 years, despite all the advances in cardiac care. That's not acceptable, and we believe that technology can help.

### Resuscitation, Prolonged Cardiac Arrest, and an Automated Chest Compression Device

Martin Risom M.D., Henrik Jørgensen M.D., Ph.D., Lars S. Rasmussen M.D., DMSC and Anne Marie Sørensen M.D., Ph.D., *Journal of Emergency Medicine*, 2009



This article describes two case studies in which the AutoPulse® (AP) was used as an adjunct to manual chest compressions in prolonged CPR events.

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# Addressing the Challenges Hospitals Face in Improving Outcomes from SCA

**Annette Fasnacht, Senior Director of Marketing for ZOLL Medical Corp., discusses how the next generation of defibrillators produced by ZOLL are even better at saving lives than their predecessors.**



**Future Healthcare** What are some of the challenges that customers face regarding the use of technology in resuscitation?

**Annette Fasnacht** Outcomes for sudden cardiac arrest in hospitals have not improved in over 30 years, despite all the advances in cardiac care. That's not acceptable, and we believe that technology can help. Some of the challenges that hospitals face include the quality of CPR, the cardiopulmonary resuscitation procedure. We found that even experienced users go too fast or too slow, too shallow or too deep, and there

are far too many pauses in the process of providing cardiopulmonary resuscitation to maintain adequate perfusion.

Another problem for hospitals is trying to capture accurate information during the chaos and confusion of a cardiac emergency. This can rapidly become a crisis situation. There are lots of interventions going on, and trying to keep track of the information is very difficult.

Maintaining accurate timeliness is another issue. One of the things that we know is the sooner we get to a patient experiencing cardiac arrest, the better the outcome. However, there are multiple sources of time information—from a wall clock to a wrist watch to the defibrillator clock—all of which may give conflicting information and which may not be set accurately. When trying to determine accurate time to first shock, to measure the quality of the response in the hospital, this all becomes very difficult to coordinate.

Lastly, another big challenge is managing the defibrillator asset. Because we want to be able to respond quickly, defibrillators are one of the most widely dispersed pieces of equipment in a hospital. However, with the exception of a few departments, like the emergency room and the intensive care unit, a defibrillator may be rarely used. This situation creates huge training and maintenance issues.

**FH** What solutions has ZOLL developed to help hospitals address these challenges?

**AF** In 2002, we started to address the CPR quality issue by providing feedback to people who are performing CPR. Every defibrillator that we manufacture today provides users with feedback about whether or not the rate and depth of their compressions is in the target range, and the defibrillator additionally tracks how long people pause. That was the first huge leap forward: introducing a way for people to see how well they were performing CPR.

In 2005, we introduced a technology called See-Thru CPR®. This is a proprietary filter that removes the artifact that CPR causes in the electrocardiogram and allows the users to see if there is an underlying organized rhythm developing. In the past, what people had to do was frequently stop compressions in order to see what the rhythm looked like. With See-Thru CPR, you don't have to pause unless you see something that looks like it might be organized. That's a huge improvement, because it helps maintain perfusion pressure.

CodeNet® is our electronic code documentation system. Using a simple, hand-held PDA, all the interventions performed in a code can be easily and quickly documented. The data from the PDA and the defibrillators is combined in a single time-synchronized record that ties back to network time in the hospital. Therefore, nobody relies on anybody writing down the time on their wrist watch or the time on the wall clock. It is all being electronically captured and is therefore very accurate. Finally, this program generates accurate quality reports that hospitals can use to assess their response times. You can compare the performance of different divisions and know where you need to address quality issues.

Lastly, we've tackled the question of asset management and training. We have a wholly interactive online training program for the defibrillator. People in the hospital can train on the product any time they have access to the Internet or the hospital network, which represents a huge reduction in hospital costs and training time. We have also just introduced Wi-Fi communication on our defibrillator. That's unique in the industry, and it will allow code data to be transmitted wirelessly to CodeNet and to the network.

In association with Wi-Fi, we have developed a suite of products designed specifically for the clinical engineer. Our Defibrillator Dashboard product, which is the suite, allows remote monitoring of every defibrillator in the hospital network. So, from any remote desktop that has access to the network, a clinical engineer can determine if a defibrillator is ready to use.

Our defibrillators test themselves once a day automatically. For code readiness, we test 40 different points, including making sure that it is plugged in, the battery is charged, and the electrode is attached. If the defibrillator fails this readiness test, the information can be e-mailed to the clinical engineer telling him the defibrillator at a certain access point needs new electrodes, or is not plugged in, or is not charged. Sometimes it's just a matter of the clinical engineer calling up the nursing floor and saying, "plug in your defibrillator." In other cases, he knows he's got to get that defibrillator and swap it out. That's going to be incredibly valuable in terms of improving staff efficiency and increasing the confidence that the product is ready, not to mention reducing cost.

#### **FH Does implementing ZOLL solutions require any proprietary infrastructure?**

**AF** No, it doesn't, and that's really the beauty of the whole thing. It all runs on standard 802.11 infrastructure and the data files that we use are so small, they won't impact the hospital bandwidth either.

#### **FH Why did ZOLL choose to focus their technology solutions strictly in resuscitation rather than offering a more broad-based monitoring IT platform?**

**AF** Working on a more broad-based platform would not be practical. Defibrillators are critical life support equipment. During a transport, for example, if you want that monitoring data, you can capture it in CodeNet. The data that is really important, though, is what happens when you need to use the product to resuscitate. You want to know if the defibrillator is ready, whether it can help you save lives, and if it will help you improve your response.

We wanted to make the product accessible to every hospital — from two beds to 1,000 beds. Hospital patients code everywhere in the hospital, but very few hospitals have organization-wide monitoring platforms. They are usually relegated to only a few telemetry and intensive care units. So it's about accessibility, as well.

#### **FH How does ZOLL view the IT portion of their solution and how it relates to the total resuscitation solution?**

**AF** Firstly, IT helps to guide performance to improve resuscitation with the CPR tools. Secondly, it is tremendously beneficial for information. Improving outcomes from sudden

death requires that ability to measure our performance and to review it with those who respond. If we don't know how long it's taking us to get there or how frequently we stop CPR and lose perfusion pressure, how do we know what to improve? We have this wonderful database of information that is unique to each code and can be aggregated to give you a hospital-wide picture.

Using IT to train and keep track of results aids in JCAHO compliance and is a very cost-effective way to improve information retention rates. The automated readiness test data can also be compiled into a very comprehensive report that demonstrates to JCAHO that defibrillator readiness is being maintained in order to maximize patient safety. It's done automatically by the defibrillator and it's captured as a database. This solution is also cost effective, and improves staff efficiency, asset management and maintenance.

#### **FH Are ZOLL data products compatible with other manufacturers' defibrillators?**

**AF** The products are not really compatible, with the exception of the CodeNet writer. Any hospital can use the CodeNet writer to code data electronically on the PDA. If you don't have the ZOLL defibrillator product, however, you aren't able to take advantage of all of the capabilities, as you can't marry it to the defibrillator record and get the single timeline vital to accurately measure response. Right now the data is captured by hand during the code — often on a set of scrubs or somebody's arm or a napkin because codes aren't something you plan for. The fact that you can have an electronic code record being collected is already a huge leap forward in understanding the process.

#### **FH What is ZOLL's vision for the future of resuscitation technology?**

**AF** We're supportive of more integration and more capability that uses technology to identify patients at risk to improve outcomes and response to reduce cost and increase staff efficiency, but only in the resuscitation space. We are experts in that area and we continue to look to move the needle in sudden cardiac death, the largest cause of death in the world. It far exceeds both cancer and HIV. The number of people in the United States who die during sudden cardiac arrest is equivalent to five jumbo jets crashing every single day. We're very passionate and focused on helping more patients survive this critical event. We're even developing a consulting service to help hospitals benchmark their performance. We'll then help them implement the tools that we've developed to help them save more lives. It's an exciting vision.

*Annette Fasnacht is the Senior Director of Hospital Marketing for ZOLL Medical Corporation. Ms. Fasnacht has more than 25 years of experience in medical device marketing and management with a background ranging from sales and sales management to marketing, clinical and international. Her experience ranges from work within start-up organizations to multinational corporations. She was most recently President of Optelec USA, where she was responsible for managing the U.S. subsidiary of the Netherlands-based Optelec, Tieman Group. Ms. Fasnacht joined ZOLL in December of 2005 in her current position.*

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# Resuscitation, Prolonged Cardiac Arrest, and an Automated Chest Compression Device

New Article in Press

*Martin Risom M.D., Henrik Jørgensen M.D., Ph.D., Lars S. Rasmussen M.D., DMSC and Anne Marie Sørensen M.D., Ph.D., Journal of Emergency Medicine, 2009*



This article describes two case studies in which the AutoPulse® (AP) was used as an adjunct to manual chest compressions in prolonged CPR events. Resuscitation guidelines emphasize the importance of providing uninterrupted chest compressions during CPR. The AutoPulse with its patented load-distributing LifeBand® squeezes a wide area of the chest, spreading out the force of the compressions and helping to maximize

blood flow. The LifeBand also allows full decompression for maximum coronary perfusion.

## Case 1

This case describes a cardiac arrest event on a 44-year-old male in which return to spontaneous circulation (ROSC) was achieved 48 minutes after continuous compressions with the AutoPulse. After 11 days of post-resuscitation interventions and care, the patient was discharged from the hospital with no neurological deficits.

## Case 2

This is a near-drowning case of a 26-year-old female who was pulled from the water with initial rhythm of VF, on whom CPR was immediately started. The AutoPulse was deployed for transport to the medical center and continued for 120 minutes after re-warming was initiated. The patient was discharged from the hospital 12 days after the accident with no neurological deficits.

In both of these cases, the patients had prolonged periods of apnea followed by spontaneous respiratory efforts after AutoPulse compressions where started. This finding signifies improved brainstem perfusion as a result of the AutoPulse generating near-normal circulation.

The difficulties of performing quality CPR for prolonged periods of time can adversely affect the chance for patients to achieve ROSC and long-term survival. The authors state that "In these cases, it would have been difficult or impossible to perform CC (continuous compressions) without the AP." The AutoPulse allowed for prolonged quality compressions under difficult circumstances, resulting in improved outcomes.

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## Sheffield Teaching Hospital in the U.K. Chooses ZOLL R Series Plus Defibrillator—AED and Manual Defibrillation in One Unit



Sheffield Teaching Hospitals Trust team of five resuscitation officers include (back row, left to right) John Goodinson, Julie Sands, and Joanne Richardson; front row Helen Till and Ian Battey. The trust has been named the top performing trust in the U.K. two years in a row.

Sheffield Teaching Hospitals Trust has been named for two years running as the top performing trust in the UK Good Hospital Guide. And for good reason. Sheffield follows the current research carefully and translates it into practice.

Most recently this practice drove the choice of the defibrillator for the trust.

When Chan et al<sup>1</sup> reported that the window of time for early defibrillation was more likely two minutes, not three as originally thought, it was clear that Sheffield first responders had to be comfortable using the defibrillator. Time was of the essence for a code team to deliver a timely shock to improve outcomes from sudden cardiac arrest. Coupled with the evidence that high quality CPR is critical for good outcomes, Sheffield's resuscitation officers began to explore various options.

The goal was to find a solution that could be readily adopted by the basic life support (BLS) trained first responders, yet would ensure a smooth transition to Advanced Cardiac Life Support (ACLS) teams. Sheffield considered using a "lay person" AED in the wards, but this would necessitate changing out the cables and defibrillator pads to be compatible with the manual defibrillator when it arrived. Conversely, experience showed that inexperienced BLS-trained providers were not comfortable using manual defibrillators, even ones that had a clearly marked AED button. The new ZOLL R Series<sup>®</sup> Plus defibrillator met the goal perfectly.

When it is turned on, only a single AED button is displayed and the defibrillator immediately begins analysis or prompts the rescuer to start CPR. With its full CPR feedback capability for correct rate and depth of chest compressions, this simple device encourages the first responder to take action. When the ACLS team arrives, the entire manual defibrillator face illuminates by pressing a key, allowing the team to take over without pause. Its See-Thru CPR<sup>®</sup> filter helps minimize pauses in compressions, allowing operators to visualize the underlying organized rhythm without stopping CPR.



As Sheffield begins to deploy its newest equipment, staff will be tracking outcomes to see how well this new technology improves such key measures as time to first shock, CPR quality and, most importantly, the increase in the number of patients who ultimately survive long enough to leave the hospital.

<sup>1</sup>Chan, P.S. et al. 2008. Delayed Time to Defibrillation after In-Hospital Cardiac Arrest. *NEJM*. 358(1): 9-17.

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## Reducing the Cost of Defibrillators

Hospitals have embraced clinical studies that indicate that early intervention yields significantly better outcomes, and now use external defibrillators throughout the hospital, not just in the ICU/CCU.



However, what it takes to keep these life-saving devices in a state of readiness and its associated costs is often overlooked. To gain a better understanding, E3 Consultants of Philadelphia, Penn., did a survey of five hospitals, and determined the annual effort and cost of maintaining defibrillator readiness in the hospital. The findings are enlightening.

The survey consistently revealed that four activities are employed to ensure defibrillators will be ready when a code situation arises. These four methods are: 1.) user defibrillator checks, 2.) preventative maintenance, 3.) prompt service and repair, and 4.) regular battery maintenance and replacement. Each activity plays a critical role in ensuring the readiness of a defibrillator. Also, E3 Consultants noted that while defibrillator technology has significantly evolved over the past 20 years, the means for testing to ensure code readiness has remained the same.

To gather data pertaining to the time and cost associated with each of the readiness activities, a questionnaire was developed and distributed to the hospitals involved in the study. The data collected was then used to calculate the annual time spent on each of the four readiness activities at each of the five hospitals surveyed. The average annual salary for an LPN and an RN in 2007 was used as the basis for this calculation. Added to this was the time involved in conducting daily defibrillator checks.

The bottom line revealed that the user defibrillator check consumes between 27 to 146 hours of nursing time per defibrillator per year. That translates to an average of 73 hours per defibrillator per year. Charged at the total annual cost, the surveyed hospitals spend \$2,363 per defibrillator per year.

These survey results clearly identified an area for improvement in maximizing both time and investment. When defibrillators were first manufactured, they had functional limitations that hospital staffing had to live with. Now 20 years later, there is an opportunity to leverage the progress that has been made by purchasing defibrillators that automatically check and report their state of readiness. These defibrillators will turn themselves on, perform the pre-determined tests and email the results to the BioMed/Clinical engineering department to verify that they pass all manufacturer's therapy related functional test parameters.

In the area of battery maintenance, the average annual time spent on battery maintenance and replacement activities is 0.3 hrs. per defibrillator.

The driving factor of battery care and maintenance is the cost of the replacement battery and the battery replacement interval. The less expensive the battery is, and the longer it can be kept in service, the lower the cost will be for this readiness activity.

It was also observed that although the manufacturer-recommended battery replacement interval was four years at four of the surveyed hospitals, most did not foresee waiting the full four years to replace the battery. They estimated they would likely replace them after 2-2.5 years of service. Extending the replacement interval to four years cut the battery maintenance and replacement costs approximately in half.

In summary, this information shows that a significant amount of hospital staff effort and cost is required to ensure the readiness of a single piece of equipment that, in many cases, is rarely used and rarely fails. It was also noted that while defibrillator technology has advanced significantly over the last 20 years, the means to maintain them has not. From the data presented and information obtained from defibrillator manufacturers, there are means of streamlining these processes to help drive down effort and cost while not sacrificing safety.

For one, the ZOLL R Series® defibrillator is equipped with extensive readiness test capabilities, which allow the unit to periodically check the key components like the state of the battery, whether the unit is plugged in and charging, and whether it is capable of discharging. It is also equipped with readiness indicators that are designed to alert the operator when the device is NOT in a state of readiness. With the addition of readiness tests and indicators, the time spent on the user defibrillator check is reduced from 1-3 times/day to once/week, thus significantly reducing the overall effort and cost of ownership.

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## ZOLL Committed to Advancing Temperature Management Technology



With its purchase of the Alsius Corporation's intravascular temperature management (IVTM™) device in May 2009, ZOLL is a leader in accurate, easy-to-use, and cost-effective control of body temperature in critical care patients.

Clinicians have a variety of temperature management techniques available, both invasive and non-invasive. In contrast to non-invasive surface cooling/warming technologies, such as cooling/warming blankets, ice packs or gel pads, which are clinically inefficient, labor intensive, and hinder access to critically ill patients needing constant care, ZOLL's invasive IVTM portfolio allows the core body temperature to be regulated internally with precision.

Key among the IVTM product line is Thermogard XP™ Advanced Temperature Management System, which provides a platform for both maximum cooling and warming applications. This offers precise and rapid control of a patient's core temperature.

The Thermogard XP system is coupled to any one of the full line of Alsius catheters, all of which provide central venous infusion capabilities. A variety of catheter options are available to handle specific patient challenges such as catheter length, insertion site, and heat exchange power. The Thermogard XP adjusts the temperature of the saline flowing within the Alsius catheter balloons. Patient and system data are automatically sampled every 60 seconds, and a change in patient temperature as small as .01C triggers an immediate adjustment in the saline temperature.

With greater awareness of the importance of temperature management, some clinicians are initiating early cooling or warming therapies in the field with temperature controlled IV fluid infusion. The Power Infuser®, recently approved for administration of therapeutic and clinically appropriate IV fluids, blood, and packed red blood cells, provides the level of control needed in the pre-hospital environment.

As the clinical community continues to expand the applications for therapeutic temperature management, ZOLL intends to work with the pioneers in temperature management to help expand the indications for therapeutic hypothermia. According to Richard A. Packer, Chairman and CEO of ZOLL, "The speed and accuracy of cooling and the accuracy of subsequent re-warming that can be achieved with our intravascular technology will be unsurpassed."

Mr. Packer concluded, "As we look to the future of therapeutic temperature management, we will be integrating the superior technologies from both Alsius and Radiant Medical, Inc., an earlier acquisition, in combination with ZOLL's own developments in this area, to provide the very best solution for patients' needs."

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## Critical Patients Saved with CPR Machine at Fresno Heart & Surgical



New technology at Fresno Heart & Surgical Hospital in Fresno, Calif., is helping revive critically ill patients and freeing nurses for more vital tasks during emergencies. The ZOLL AutoPulse® cardiac support pump takes over the work of chest compression during cardio-pulmonary resuscitation.

Registered nurse Shelly Bressoud, clinical coordinator of the hospital's cardiac evaluation center, says the AutoPulse does a better job than nurses can. "Chest compressions are more consistent in depth and pressure. And the perfusion in the body is much better," she said, describing how the machine's steady squeezing helps move blood and needed oxygen around the body to vital organs.

The hospital, which is part of the Community Medical Centers network, has used the AutoPulse about 20 times in the past year, said registered nurse Mario Schiltz, the hospital's clinical nursing educator. He remembered one particularly dramatic save using the AutoPulse pump.

A man in his late 60s, who had a history of cardiovascular problems, was recovering from surgery on his leg when his blood pressure began to plummet and his heart began to beat irregularly and rapidly. A Code Blue emergency was called. Moments after starting CPR manually, the medical team applied the AutoPulse and the device took over the chest compressions. Within 30 seconds, Schiltz described, "The patient started to shake his hands and move his hands and feet. That's really unusual for cardiac arrest."

It was so unusual, that Schiltz said medical personnel questioned whether the man was really having a heart attack. "We turned off the machine for about five seconds to check the patient again," he said. "His blood pressure immediately fell." As soon as the patient went limp again, the team immediately resumed the AutoPulse and saw the same results. Schiltz said the patient woke up and was able to talk with the doctor to say he wished to continue with the resuscitation effort. The AutoPulse generated enough blood flow to the patient's brain that he remained conscious and was able to breathe on his own. And when he returned to the recovery area, the man was able to speak with his family right away.

Both Bressoud and Schiltz said in addition to reviving patients, the AutoPulse reduces the amount of nurses needed in such emergencies and helps to calm the situation. "It's another resource for us," Bressoud said. "With CPR the recommendation is to switch out people frequently. When you're doing 100 compressions in a minute you can get really tired fast." With fewer people needed for the chest compressions, nurses can focus on monitoring vitals and other treatment needs.

Schiltz said he appreciates the noticeable difference in atmosphere with the AutoPulse. During emergencies it can get hectic with lots of people in a small, tight area, and people



trying to position themselves for the best angle of compression. With the AutoPulse, “people are able to step back and really look at what was going on with the patient,” he said.

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## **ZOLL LifeVest Prescribed by Physicians at Every *U.S. News and World Report* “Honor Roll” Hospital**



Editors at *U.S. News and World Report* magazine analyze data from over 5000 medical centers to provide its readers a list of the best hospitals in the United States. Only 170 hospitals were ranked in one or more specialties and of those, just 19 were selected for its prestigious “Honor Roll” designation. ZOLL is proud to announce that the ZOLL LifeVest® Wearable Defibrillator has been prescribed for patients by physicians at all of the “Honor Roll” hospitals.

The LifeVest is a unique, non-invasive defibrillator worn by patients at increased risk for sudden cardiac arrest (SCA). The LifeVest constantly monitors the patient’s heart and, if a life-threatening heart rhythm is detected, delivers a potentially life-saving treatment shock, without bystander intervention. The entire event, from detecting a life-threatening arrhythmia to automatically delivering a treatment shock, usually occurs in less than a minute. Timely defibrillation is the single most important factor in saving a SCA victim’s life; the LifeVest has a 98 percent first treatment shock success rate for treating patients with SCA.

The LifeVest is considered a treatment option for patients who meet certain criteria, including but not limited to:

- Immediately after a heart attack during the recovery and evaluation process to determine if the patient should receive an ICD;
- Before and after coronary bypass and angioplasty procedures to allow for recovery and evaluation for the need of an ICD;
- Patients awaiting a heart transplant or patients with terminal diseases;
- Recently diagnosed or suspected conditions such as cardiomyopathy, which might require additional follow-up and evaluation; or
- After an ICD is removed due to complications or other medical reasons.

The LifeVest also may be prescribed by a physician for patients who are awaiting surgery for an ICD, until their heart gets stronger, or their physician decides on another course of treatment.

The LifeVest has been prescribed for over 16,000 patients and is covered by Medicare and most other insurers for those patients at high risk of cardiac arrest.

The 19 “Honor Roll” hospitals, listed in order here, include such esteemed medical facilities as Johns Hopkins in Baltimore which is ranked number one; the Mayo Clinic in Rochester, Minn.; Ronald Reagan UCLA Medical Center in Los Angeles; Cleveland Clinic in Ohio; Massachusetts General Hospital in Boston; New York Presbyterian University Hospitals of Columbia and Cornell in New York; University of California, San Francisco Medical Center; Brigham and Women’s Hospital in Boston; Duke University Medical Center, Durham, N.C.; Hospital of the University of Pennsylvania, Philadelphia; University of Washington Medical Center in Seattle; Barnes-Jewish Hospital/Washington University, St. Louis; University of Michigan Hospitals and Health Centers, Ann Arbor; University of Pittsburgh Medical Center; Vanderbilt University Medical Center, Nashville; Stanford Hospitals and Clinics, Stanford,

Calif.; University of Chicago Medical Center; Cedars-Sinai Medical Center, Los Angeles; and Yale-New Haven Hospital, New Haven, Conn.

To learn more about the LifeVest, please visit: [www.zoll.lifecor.com](http://www.zoll.lifecor.com).

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# Resuscitation Survey Results

## Emergency Physicians Rank Increased Bystander CPR, Faster Patient-to-Doctor Time, Data Collection and Technology as Critical Improvement Areas in Resuscitation

As the only company focused solely on resuscitation, ZOLL sponsored the first State of Resuscitation survey with an educational grant to American College of Emergency Physicians (ACEP) in support of ACEP's 40th anniversary efforts in November 2008. The survey, which was conducted among select groups within ACEP's membership of more than 27,000 and its results, was designated to "advance" resuscitation.

Among the key findings are that resuscitation practices have improved, but that there is considerable room for improvement in the future. While no specific brands were mentioned in the survey, advances in technology are viewed as having a positive impact on survival rates. There is also a need for better training devices like PocketCPR®, and information on CPR performance like that provided by RescueNet® Code Review.

Emergency physicians cite increased bystander CPR, faster patient-to-doctor time, improved data collection and sharing, and greater use of technology as critical to improving resuscitation for victims of sudden cardiac arrest (SCA).

"While we've made significant advances to improve resuscitation efforts, more needs to be done. The State of Resuscitation survey offers valuable insights on how we can build upon already existing practices, including increasing public involvement and implementing technology to help save more lives," said Dr. Nick Jouriles, president of ACEP. "The results clearly show that it is necessary for communities to encourage more CPR trainings, offer more access to a broader range of critical life-saving technologies, and report sudden cardiac arrest cases more consistently."

The survey shows that 9 out of 10 respondents (88 percent) consider bystander intervention an important factor to increase survival. Other factors viewed as having a positive impact on survival rates include faster patient-to-doctor time (77 percent), data collection and sharing (73 percent), automated technologies (66 percent), and real-time feedback on compressions (65 percent).

You can request a copy of the full survey at [info@zoll.com](mailto:info@zoll.com).

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